AN EMPIRICAL ANALYSIS OF MOTIVES FOR TERMINATION OF DEFINED BENEFIT PENSION PLANS

by

CASSANDRA RENEE COLE

(Under the Direction of David W. Sommer)

ABSTRACT

Statistics gathered by the Pension Benefit Guaranty Corporation indicate there was a great deal of variation in the number of standard defined benefit pension plan terminations between 1985 and 1995, reaching an all time high of almost 12,000 in 1990. In response, there have been several academic studies published that tried to explain why firms were terminating these plans. Prior studies attempted to explain this phenomenon by observing firm level data of overfunded defined benefit pension plan terminations. This study attempts to expand prior literature by creating a more comprehensive examination of the termination decision. In doing so, the study intends to provide answers to three questions. First, do motives for termination differ by funding status? Second, do motives vary in when they become evident and have they changed over time? Finally, are companies honest about why they are terminating plans? The results of the study indicate that there are differences in the motives for termination of overfunded and fully funded defined benefit pension plans and that these motives do vary in when they become evident. Overfunded defined benefit plans are motivated by financial distress, expropriation, tax advantages and regulation. The results suggest that if termination is motivated by financial distress or the cost of plan administration, firms are likely to terminate their overfunded plans within one year. If the termination is motivated by other reasons, the motives are evident two or three years prior to termination. For fully funded plans, the results only support the financial and regulatory motives for termination. These plans also seem to be more sensitive to regulatory changes than overfunded plans.

INDEX WORDS: Defined benefit, Pension plans, Termination, Pension asset reversion

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B.B.A., Howard University, 1995

A Dissertation Submitted to the Graduate Faculty of The University of Georgia in Partial Fulfillment of the Requirements for the Degree

DOCTOR OF PHILOSPHY

ATHENS, GEORGIA

2002

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May 2002

ACKNOWLEDGEMENTS

I would like to first thank the members of my committee: David Sommer, Chistopher Cornwell, Sandra Gustavson, Robert Hoyt and Annette Poulsen. Without their support and assistance, the completion of this project would not have been possible. I would like to especially thank my committee chair, David Sommer, for his patience and guidance.

I would also like to thank the University of Georgia, the Spencer Education Foundation and the State Farm Companies Foundation for their financial support throughout this process. Finally, I would like to say a special thanks to all my family and friends whose support and love helped me endure the past five years. To my parents, who have always had faith in my abilities and my husband, who has been there during the good and the bad times, there are no words to express how much your support has meant to me.

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CHAPTER 1: INTRODUCTION

Purpose of the Study

Significant changes have occurred to pension plans since the passage of the Employee Retirement Income Security Act (ERISA) of 1974. Among other things, this Act created the Pension Benefit Guaranty Corporation. The purpose of the PBGC was to guarantee, to some maximum limits, the pension benefits of workers covered by defined benefit pension plans. The PBGC was funded through a premium charge to the employers.

Examining the number of standard terminations of defined benefit pension plans that have occurred since the creation of the PBGC, it can be seen that the number of terminations has fluctuated greatly, with many terminations occurring in the late 1980s and early 1990s. As reported by the PBGC in its annual Data Book, the most terminations occurring in any one year since its inception occurred in 1990. Almost 12,000 plans were terminated in this year. The most terminations occurring in any one year in the 1970s were 8,932 (in 1976). The number of standard terminations subsequently dropped until 1980, after which they began to increase rather steadily, with more than 10,000 terminations occurred in 1988.

The overall increase in the number of standard terminations sparked much research in the area of pension plans because of the potential impact on the retirement

income of workers. Because there are differences in the design of the plans, each type of plan has varying levels of financial uncertainty for both firms and workers. Also, the plans differ in who bears the investment risk. As explained in greater detail later, employers bear the investment risk with defined benefit plans. They are responsible for making sure that plan assets are sufficient to honor promised benefits. On the other hand, with defined contribution plans, employers generally make a contribution that is a set percentage of employees' salaries. Employees typically choose from a variety of investment options and, therefore, bear the investment risk. As a result, termination of defined benefit pension plans and the concurrent increase in the number of workers covered by defined contribution plans could potentially affect the adequacy of the retirement income of workers. In addition to individual workers' retirement income, the shift could adversely affect society as a whole. This is because if many workers' savings are not sufficient to last through retirement, they have to rely on family or the government for financial support for the remainder of their lives. Therefore society will, in effect, subsidize the retirement income of these individuals.

Recent studies that have attempted to explain the gain in market share of defined contribution plans beginning in the mid-1970s have considered factors such as legislative changes, employment shifts and the introduction of new types of pension plans. Studies considering legislative changes focused on the effect that legislation has had on the administrative costs of defined benefit plans, suggesting that the cost differential between defined benefit plan and defined contribution plan administration played a significant role in the observed shift in the market [Clark and McDermed (1990), Kruse (1995)]. This

cost factor is incorporated into this study by examining its affect on the probability of termination of defined benefit pension plans.

Studies that have examined motives for termination of defined benefit plans have considered a variety of factors. Some have focused on the financial aspects of the firm, consistently finding support for the use of pension assets in firms' overall financing decisions. Other studies considered the potential expropriation of wealth from workers to managers and stockholders and the possible tax incentives as motives for termination, finding some support for each of these hypotheses.

The purpose of this study is to fill some of the gaps in prior literature, to reconcile some inconsistencies found across the literature and to provide a more complete analysis of the termination decision. In doing so, the study intends to provide answers to three major questions. First, do motives for termination of defined benefit plans vary by funding status? Second, do motives vary in when they become evident and have motives for termination changed over time? Third, are the reported reasons for termination empirically supported (are firms being truthful when reporting reasons for termination)? The study also observes replacement plan trends and organizational changes in an effort to determine how much of the increase in defined contribution plan market share can be explained by the terminations of defined benefit plans and if there are an outside forces that have potentially affected the termination decision.

Growth in Employee Benefits

A United States Chamber of Commerce study found that for the 802 firms it surveyed, the average payment of employee benefits as a percentage of payroll has

increased over the years, rising approximately 2 percent between 1986 and 1996. Of the 41.3 percent of payroll used for employee benefits in 1996, 5.8 percent represented employer contributions to pension plans.[1] During the period when much of the research on terminations of defined benefits plans was published, Mitchell and Mulherin (1989) place this percentage in terms of dollars. Comparing the assets in pension funds to the equity on the New York Stock Exchange, they report that at year-end 1987, it was estimated there was over $1 trillion in pension assets and approximately $2.2 trillion in equity on the NYSE. Of the $1 trillion in pension assets, more than $800 billion were in defined benefits pension plans.[2]

Beam and McFadden (1998) discussed various causes for this increase in employee benefits. They suggested that in response to the wage freezes during both World War II and the Korean War, employers used benefits to attract and retain workers. Another reason cited for the growth in employee benefits was the move from an agrarian-based economy to a more industrialized economy. People became more self-reliant and less dependent on family, thus protection against premature death and sickness became more important. Benefits were used to cover these basic needs of employees, but also to improve productivity and reduce turnover. Finally, legislation mandating certain benefits, the preferential tax treatment afforded benefits, the importance of unions in negotiating contracts and the cost and advantages of group insurance also contributed to the growth in employee benefits.

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[1] U.S. Chamber of Commerce. "Employee Benefits." 1997.
[2] U.S. Department of Labor. "Trends in Pension 1992." 1992.

The Role of Pension Plans in Corporate Financial Policy

As mentioned earlier, the purpose of the Pension Benefit Guaranty Corporation was to provide insurance for beneficiaries of defined benefit pension plans in case of default by the plan. Because of the great exposure to catastrophic loss, this type of insurance was not available in the private sector. One of the major changes resulting from the Employee Retirement Income Security Act was the ability of the PBGC to place claims on a firm's assets, other than those set aside to cover pension liabilities, on behalf of the beneficiaries if an underfunded plan was terminated.[3] In addition to creating the PBGC, ERISA also provided employers with rules regarding vesting, participation and funding requirements.

ERISA sparked much research on the role of pension plans in corporate financial policy in the late 1970s and early 1980s. The research typically examined only defined benefit pension plans because almost all early pension plans were defined benefit plans. The studies focused primarily on the premium structure established by the PBGC and the tax advantages of qualified pension plans.

One area of research focused on what was termed the put effect [Sharpe (1976), Treynor (1977)]. This research examined the financial implications of the termination requirements set by the PBGC. The put effect suggested that the insurance provided by the PBGC created a put option for the firm. As mentioned in footnote 3, in exchange for

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[3] The PBGC could claim up to 30 percent of the net worth of a firm if it terminated an underfunded pension plan. Prior to this, beneficiaries only had claims on the assets specifically set aside to cover pension liabilities. The 30 percent cap was phased out over a three-year period. It was completely eliminated in 1997.

the pension assets and up to 30 percent of its net worth (The sample period examined does include the period during which the cap was phased out, however, during the time this research was conducted, the cap was in effect.), it could terminate a plan and "put" its pension liabilities on the PBGC. The value of the put option increased as the value of the underlying asset decreased, as risk increased or as promised benefits increased. As a result, it was suggested that a firm could maximize the value of the put by funding at minimum levels and investing in risky assets to the maximum amount possible.

Other studies focused on the tax advantages of pension plans [Black (1980), Tepper (1981)]. They hypothesized that since the returns on pension assets are allowed to accumulate tax-free, pension plans should be funded at a maximum level and in the most heavily taxed investments. Those studies that considered both the put effect and the tax effect suggested that the optimal strategy may lie somewhere in between. This idea is supported by examining the actual mix of pension investments. Studies found that approximately 90 percent of the firms had mixed portfolios (stocks and bonds) and that in 1981, investments in equities ranged from 19 percent to 74 percent [Tepper (1981), Bodie, Light, Morck and Taggart (1987)].

A study by Bodie, Light, Morck and Taggart (1987) looked generally at how pension assets were viewed by firms. They described two contrasting perspectives on pension plan assets and their role in corporate financing. The Traditional Perspective suggested that pension assets were separate from the other assets of the firm and should be managed in the best interest of the beneficiaries. The Corporate Financial Perspective suggested that pension assets and liabilities were simply part of the firm's total assets and

liabilities and therefore decisions regarding financial policies should be made in the best interest of shareholders. Both investment strategies relating to the put effect and the tax effect would fall under the Corporate Financial Perspective. The authors found that when firms were doing well, they increased their level of funding, benefiting from the tax shield. They also found that more profitable firms would choose lower discount rates to overstate pension liabilities to allow for increased funding. These results supported the Corporate Financial Perspective, suggesting that firms consider pension assets as part of total firm assets and make decisions regarding pension management based on the overall financial needs of the firm.

Types of Pension Plans

Pension plans can be categorized as defined benefit or defined contribution plans. Defined benefit plans, which are the focus of this study, are plans in which the firm promises to pay certain benefits to workers upon retirement based on some predetermined formula. Formulas can be some flat amount or a function of length of service, earnings or both. Since these benefits are promised by the firm and determined by a formula, it is the firm that bears the investment risk. It has to make contributions to the plan so that the assets of the plan are sufficient to satisfy its liabilities.

With defined contribution plans, each participant has a separate account and often maintains discretion on how the funds are invested. The retirement benefit is based on the amount of money in the individual's account at retirement, therefore, it is the participant that bears the investment risk. Typically, the firm makes some contribution to the individual's account as either a percentage of the participant's salary, a percentage of

the firm's profit or the amount it estimates is needed to provide some target level of retirement income.

Types of Defined Benefit Plans: Defined benefit plans are classified as either deferred benefit plans or cash balance plans. Deferred benefit plans are those that have set formulas as mentioned above. With cash balance plans, each participant has a "paper account" that is credited yearly. One credit is typically a percentage of participants' salary and the second credit is based on some guaranteed rate of return, usually based on an external index such as the t-bill rate. This plan qualifies as a defined benefit plan because the rate of return is guaranteed and not actually based on the performance of the investments.

Cash balance plans, which have recently become popular among firms, have faced criticism and caused some confusion for workers. One such case that brought attention to these plans involved IBM. IBM announced its intent to switch from the traditional defined benefit plan to a cash balance plan during the summer of 1999. Many participants complained and were against the change as they estimated it would reduce their expected retirement benefits by 20 to 50 percent (Auerbach and Schultz, 1999). Other participants complained to the Labor Department that they were not given adequate information as to how their benefits were going to be affected. As a result of this case, firms considering this conversion are closely watching how IBM deals with this disclosure issue. Disclosure becomes an even bigger issue when plan participants are given a choice of either staying in the old plan or moving to the new plan.

Types of Defined Contribution Plans: There are several types of defined contribution plans. The money purchase plan is one of the simplest plans in which the firm specifies what it will contribute to each participant's account (typically a percentage of salary). Another type of defined contribution plan, called a target benefit plan, is based on some initial target retirement benefit. A contribution rate is determined and maintained, however, since it is a defined contribution plan, adjustments are not made based on the performance of the investment to ensure the retirement benefit meets the target.

Several other plans, typically referred to as profit-sharing plans, base contributions on the profits of the firm or some matching of participants' contributions up to a preset maximum level. These types of plans include 401(k)s, stock bonus and employer stock ownership (ESOPs) plans. One major difference between these types of plans and target benefit and money purchase plans is that with these plans, contributions can vary depending on firm performance and/or participants' contributions. With target benefit or money purchase plans, contributions are fixed based on some initial pre-determined percent of salary or target retirement benefit.

Comparing Defined Benefit and Defined Contribution Plans: One major difference between defined benefit and defined contribution plans is that with defined benefit plans, its firms that face the greatest financial uncertainty, as they bear the investment risk. As mentioned above, since firms have promised certain levels of benefits to workers, the contributions they are required to make to plans can vary significantly depending on the performance of their investments. These variable contributions expose the firms to greater potential liability than defined contribution plans because with defined

contribution plans, the contributions are typically fixed (or even discretionary) and can be better predicted. Also, with defined contribution plans, it is the participants that bear the investment risk, therefore they face the greatest financial uncertainty with these types of plans.

There are advantages and disadvantages to both defined contribution and defined benefit plans, from both the firm's perspective and the participant's perspective. As discussed above, defined benefit plans provide greater financial uncertainty for firms but provide a more stable replacement income to participants. Defined contribution plans limit financial uncertainty for firms and allow participants more control over their investments (allows them to determine what level of risk they are willing to accept by allowing them to choose how their money is invested). Defined contribution plans are also more portable, or can be rolled into other plans if participants leave the firm. On the other hand, since participants' retirement income is based on the amount of money that has accumulated in their account at retirement, participants bear the risk that their retirement income may not meet their retirement needs if their investments perform poorly [Bodie, Marcus and Merton (1988)].

Public Policy Implications

The importance of the termination of defined benefit plans and the shift in market share that has occurred between defined benefit and defined contribution plans has been recognized by legislators and organizations such as the PBGC. As mentioned earlier, workers bear the investment risk in defined contribution plans. As a result, if the market performs poorly or the worker makes poor investment decisions by investing too much in

risky assets, income at retirement may not be sufficient to meet the worker's needs. Because of this possibility, some feel that the reduction in the number of defined benefit pension plans could adversely affect a significant number of workers.

According to recent trade press reports, in an attempt to "revitalize" defined benefit plans, the PBGC is speaking with various parties to determine why there has been a decline in market share and what they feel can be done to reverse it [Geisel (1999)]. Suggestions include increasing maximum benefit levels and revising stringent legislation so that employers could have more flexibility in defined benefit plan design. Members of Congress are listening, as several bills were introduced during 1999 and 2000 aimed at resolving some of these issues. Firms' motives for termination and possible explanations for the shift in market share identified in this study could aid in designing legislation more effective at addressing this issue.

Contributions to the Literature

This study expands prior research in several ways. By examining motives for standard terminations of all defined benefit pension plans, comparisons are made between the motives for termination of fully funded and overfunded defined benefit plans. This differs from prior research in that prior research relating to terminations has only considered overfunded defined benefit plans (terminations where reversions were $1 million or more) which only account for a small percentage of total standard terminations. This reduces the potential sample size considerably. It also ignores the factors considered by firms with fully funded plans (plans with excess assets of less than $1 million) that are terminated and how they may differ from those of overfunded plans. For example, since

termination of an overfunded defined benefit plan could result in a significant cash inflow to the firm that could be used to fund other projects, lower its debt ratio or fund an acquisition, a firm's motives for termination of an overfunded plan may be driven by a need for an infusion of capital. This is likely not to be a motive for a firm with a fully funded plan because the firm would not receive any substantial cash inflow. Another contribution of this study is that it will also examine the reason for termination the firms report to the PBGC along with the empirical results to see if the reported reason is empirically supported.

The study also improves on the methodology of prior research. First, it incorporates categories of motives that were examined in isolation or only in combination with one or two other motives in most prior studies to create a more complete model. It will also improve on previous models by examining both firm level and plan level data. A comprehensive analysis of this sort has only been provided by one other termination study. Second, it examines motives for termination not just one year prior to the event but two and three years prior to termination as well. Since termination can be a lengthy process and part of a firm’s overall financial plan, it is possible that the termination decision is made far in advance of the actual event. Therefore, motives that may not have been supported in other studies that examined data only one year prior to the termination may be supported by a more extensive examination of plan and firm data two or three years prior to the event. Finally, the study examines a longer time period (from 1988 to 1997) and includes more recent data than previous studies. Sub-periods are also examined to determine if motives for termination have changed over time.

Few studies have attempted to integrate causes in the shift in market share with motives for termination [Kruse (1995), Papke (1996)]. This study will examine successor plan information of terminating defined benefit plans. The purpose is to determine if the replacement plan decision of firms has contributed to the gain in market share of defined contribution plans. For example, if the majority of terminated defined benefit plans are replaced with defined benefit plans, then the shift in market share between defined benefit plans and defined contribution plans can not be attributed primarily to defined benefit plan terminations.

Organization of Study

The remainder of the study is organized as follows: Chapter 2 provides a literature review of the prior research relevant to this study. The chapter contains a discussion of the studies relating to motives for pension plan terminations, as well as some that have examined causes of the shift in market share between defined contribution and defined benefit pension plans.

Chapter 3 explains the methodology used to test the motives for termination of overfunded pension plans. Reported reasons for termination, successor plan information and organizational changes are also examined. It discusses the data used and their sources. It also specifies the empirical models, defines the variables included and their predicted signs based on the hypotheses developed. A discussion of how the variables chosen compare to variables used in prior studies is also provided. Finally, the results of the models are presented and compared to the predictions made earlier as well as to the results of prior studies.

Chapter 4 provides an identical analysis for fully funded plans. It first examines the motives for termination of fully funded defined benefit pension plans. Since motives for these plans have not been considered in prior studies, this chapter greatly contributes to the literature on defined benefit pension plan terminations. It also compares the motives for fully funded plan terminations with those of overfunded plans and discusses how and why they should differ.

Chapter 4 next examines the reported reasons for termination to determine if they are supported by the results of the empirical model. Finally, trends in successor plans as well as organizational changes are observed to determine if terminations of this group of defined benefit plans may have contributed to the shift in market share that has occurred between defined benefit and defined contribution plans and whether or not the termination decision may have been influenced by outside forces.

Chapter 5 concludes, focusing on the implications of the results. It interprets the results found in the preceding chapters and explains how they may be used by legislators to design legislation that could be effective in reviving interest in, and promoting the growth of, defined benefit plans.

CHAPTER 2: LITERATURE REVIEW

Introduction

The purpose of this chapter is to: (1) discuss some of the major legislative changes relating to pension plans that occurred during the sample period and (2) review the literature relating to pension plan termination and the shift in the pension plan market that is the focus of this study. A review of the major legislative changes and areas of prior research directly related to this study will more explicitly illustrate the gaps in the literature.

Legislative Changes

Legislative changes relating to pension plans have occurred in several areas since 1986. One area of change resulted from the put effect created by PBGC. As discussed earlier, because of the flat fee premium originally established, firms had little incentive to fully fund pension plans or closely monitor the plans' investment risk. Legislation in this area affected the cost of administration. Another area of legislative changes affected the cost of termination of pension plans with the institution of an excise tax and more stringent rules required for termination.

PBGC Premium and the Cost of Administration: When the PBGC first began to operate, the cost of the insurance was $1 per plan participant. This flat fee increased over the next

few years until it reached its current level of $19 per plan participant.[4] Examining thePBGC's net position since its inception, it can be seen that the organization operated at a deficit through 1995. The flat fee schedule did not take into account firms' funding levels, thus creating an environment in which moral hazard could lead to intentional underfunding or excessive risk-taking. Hsieh, Ferris and Chen (1994) examined the issue of whether or not the premium charged by the PBGC was fairly priced. Their results suggested that underfunded plans were undercharged while overfunded plans were fairly charged. The authors also examined the investment mix of both underfunded and overfunded plans. They did not, however, find support for the theory that plans will invest more in risky assets when underfunded as is suggested if the firm is attempting to maximize the value of the put option.

One legislative change instituted to deal with the put option problem involved the addition of a variable premium to the base premium for underfunded plans. Originally, there was a cap placed on the amount of the variable premium (which reached $53 in 1994). The cap was phased out from 1994 through 1996.[5] Now, firms are charged premiums that take funding levels into consideration, thereby reducing the attractiveness of intentional underfunding. Since 1996, the PBGC has operated at a surplus, reaching a

[4] The Omnibus Budget Reconciliation Act of 1987 and the Omnibus Budget Reconciliation Act of 1990 both increased the PBGC base premium during the sample period. The 1987 Act increased the premium from $8.50 to $16.00 per plan participant and added an additional premium of up to $34 per participant for plans that were underfunded. The 1990 Act increased the premium from $16.00 to 19.00 per plan participant and increased the cap for underfunded plans to $53.00.

[5] The variable premium cap was phased out by the Retirement Protection Act of 1994.

record $5 billion in 1998. This record surplus is also attributed to the bull market and the lack of large, underfunded terminations [Geisel (1999b)].

Cost of Termination: Several regulatory changes have affected the cost of termination. The Tax Reform Act of 1986 instituted a 10 percent excise tax on the amount of money the firm would receive upon termination (the amount of the pension assets in excess of the pension liabilities). Subsequent legislation raised the tax to its current level of 20 percent, or 50 percent if less than one-quarter of the reversion is placed into some replacement plan (Omnibus Budget Reconciliation Act of 1990). A *Wall Street Journal* article (Schultz, 1999, C19) points out how firms are taking advantage of this exception to the 50 percent excise tax. Montgomery Ward & Company terminated its pension plan, which had a surplus of $270 million. By placing one-quarter of the assets into a replacement plan, Ward is still expected to receive a reversion in excess of $170 million.[6]

The Single Employer Pension Plan Amendment Act of 1986 and the Omnibus Budget Reconciliation Act of 1987 changed the termination procedure firms were required to follow for all types of terminations. For standard terminations, they outlined the notification procedure for beneficiaries as well as time limitations for filing a termination notice with the PBGC and distribution of assets. Specifically, prior to 1987, if a plan did not clearly indicate that excess assets in a plan could be reverted to the firm following a termination, a firm could amend the plan to that effect immediately before terminating it. OBRA of 1987 changed this procedure, requiring that an amendment

[6] Since Ward is currently in Chapter 11, its net operating losses may completely offset its tax liability, thus allowing the firm to receive the full amount of the reversion.

allowing reversion of excess assets to the firm would not be effective until 5 years after its adoption.

Plan Terminations

Throughout the early 1980s, there was a steady increase in the number of standard defined benefit pension plan terminations filed with the PBGC, peaking in 1990 with 11,800[7]. These standard terminations include only terminations of defined benefit pension plans whose assets are sufficient to satisfy their liabilities. In cases where the pension assets exceed the pension liabilities, firms can receive the excess assets upon termination. Terminations where the reversion exceeded $1 million resulted in a total of more than $12 billion reverting to firms between May 1980 and March 1986 [Thomas (1989)]. This represented a significant inflow of funds to firms.

Much of the early research in the area of pension plans resulted from this increase in plan terminations. These studies considered four categories of motives for termination: financial, expropriation, tax and regulation. The following section summarizes and compares the major findings of studies in these four areas. Inconsistencies in their results are also discussed.

Financial Motives: The most recent study to focus on financial motives for termination is that conducted by Hsieh, Ferris and Chen (1997). Their study covered the period from 1980 to 1989 and contained both survey and event study methodology. First, they surveyed the CEO or CFO of firms petitioning the PBGC for plan termination. Though

[7] Pension Benefit Guaranty Corporation, 2000.

more than 63 percent of the respondents indicated changes in benefits as the reason for termination, respondents also indicated that merger or takeover and financial health affected the timing of plan termination.

The paper's empirical analysis suggested that firms were more likely to terminate a plan when cash was needed to honor short-term liabilities. They also found that firms experiencing greater financial distress were more likely to terminate a plan while those experiencing less financial distress used other methods, including debt or equity sales, to generate cash flow. These results, which were consistent with the results obtained in prior studies [Petersen (1992), Thomas (1989), Mittelstaedt (1989)], suggested that overfunded defined benefit plans were being terminated when firms needed an infusion of capital.

The paper that provided the most comprehensive analysis of the termination decision is that of Petersen (1992). Prior to the Petersen study, only two other studies included plan level variables in their termination regression models. These studies, however, limit their analysis to only one variable. Those plan level variables considered were union status [Hammadallah and Ruland (1986)] and excess assets [Stone (1987)]. Thomas (1989) did examine the percentage of workers that were vested in his study, however, this was done only in a median comparison, not a termination regression model. As observed by examining Petersen's sample, firms commonly terminate one of their defined benefit pension plans while maintaining others. This suggests that the decision to terminate may be made on a plan-by-plan basis.

The results of Petersen's study did support the inclusion of plan level variables in the termination decision model. The variable measuring the normal cost (plan expense) per participant was significant and positive. This result suggests that the probability of termination is greater for more expensive plans.

Two earlier studies that focused primarily on the use of excess pension assets as a source of internal capital were those of Stone (1987) and Hammdallah and Ruland (1986). Stone found that firms built up financial slack in pension funds and that this slack was likely to be used when "(1) the firm generates a smaller proportion of its resources internally, (2) the market assigns a lower value to its cash flows, and (3) the firm has incentives to avoid debt financing." These results were consistent with the pecking order financing theory developed by Myers and Majluf (1984) which hypothesized that firms made financial decisions based on cost and the level of risk, preferring means of financing that were the least expensive and least risky.

Expropriation Motives: The concept of expropriation of wealth from workers through the termination of a pension plan is founded in labor contract theory. Ippolito (1985) empirically examined the issue of whether or not an implicit contract exists between employers and employees. He found that a firm's promise to pay real pension benefits upon the retirement of a worker (back-loading of compensation) does create an implicit contract under which the worker loses if he leaves the firm. Ippolito expanded on this implicit contract theory in 1986, relating it to terminations. Since workers may accept a lower wage in anticipation of promised future retirement income, firms can gain at the

expense of workers by terminating pension plans before workers have reached retirement age.

The expropriation issue was empirically examined by Petersen (1992). His study included variables that measured the types of workers participating in defined benefit pension plans and the types of plans[8] available to workers to determine if wealth expropriation occurs as a result of plan termination. He found that more generous plans and plans with more vested and retired employees were more likely to terminate. These results supported the hypothesis that wealth expropriation occurs when a pension plan is terminated.

Some of the literature examining who receives the benefit of pension plan termination also considered whether expropriation of wealth occurred. One of the earliest of these studies by Alderson and Chen (1986) further develops the Traditional and Corporate Financial Perspectives described by Bodie et al. in Chapter 1. Now called the Separation Hypothesis and the Integration Hypothesis, respectively, they focused on the effect pension plan terminations had on firms' stock prices. Under the Separation Hypothesis, the termination of a pension plan and the recapturing of the excess assets by the firm would represent expropriation of wealth from workers to stockholders.[9] A change in stock price was expected if the separation hypothesis was correct. The

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[8] The type of plan is not included as a variable in this study because starting in1988, firms were required to indicate that they had a defined benefit plan on the IRS 5500 Form, but not the type of plan.

[9] Alderson, M. J. and K. C. Chen, 1986, Excess Asset Reversions and Shareholder Wealth, Journal of Finance 41, 227.

Integration Hypothesis predicted no effect on stock price, as termination was viewed simply a "rearrangement of value between the asset groups and not a net gain to the consolidated entity." They found a significant abnormal return around the legal date of termination for their sample of 58 firms. This result was consistent with the separation hypothesis.

VanDerhei's (1987) study the following year attempted to determine if in fact firms experienced positive abnormal returns as a result of termination announcements, and if this market reaction only occurred in certain situations. VanDerhei suggested that one of the limitations of the Alderson and Chen study was the event date used. Alderson and Chen used the legal date of termination; however, VanDerhei's view was that this was not the time at which the information reached the public. Using instead the filing date, VanDerhei found positive abnormal returns around the termination date for his total sample of 37 firms.

Another limitation of the Alderson and Chen study was that they treated all terminations the same, not considering the reason the firm provided for the termination or if any successor plan was implemented. VanDerhei found that those firms involved in an ownership change actually experienced negative abnormal returns. The positive abnormal returns for the total sample was driven by firms that announced the adoption of another pension plan following the termination. The results confirmed the signaling argument, indicating that terminations revealed positive information about the firm. For example, if the market expected the excess assets would be used to fund positive net present value projects, then terminations could be viewed as favorable. Lastly, the author

examined the source of the abnormal returns and concluded that financial and tax implications also significantly affect returns.

Subsequent studies examining abnormal returns surrounding pension plan terminations found mixed results. One of the more recent studies by Datta et al. (1995) did find positive abnormal returns, as did Alderson and VanDerhei (1992), while those of Mittelstaedt and Regier (1990) and Moore and Pruitt (1990) did not. The two 1990 studies suggested that some earlier studies did not adequately control for confounding events and that these confounding events were driving the results. This can be seen by closely examining the Moore and Pruitt study. The authors used the same sample of firms used in the Alderson and Chen study, but excluded firms involved in other events that may influence the termination decision such as restructuring announcements or merger bids. This eliminated 13 firms from the sample. Tests using the remaining 45 firms yielded no abnormal returns.

Tax Motives: One study that focused solely on tax motivations is that of Clinch and Shibano (1990). The authors examined terminations occurring between 1980 and 1985 and found a significant relationship between the reversion decision and tax benefits. Tax benefits considered were the level of federal tax payments and tax loss carryforwards. These results were consistent with several other studies, including that of Hamdallah and Ruland (1986), finding support for the hypothesis that tax considerations did affect the decision to terminate a pension plan. Hsieh, Ferris and Chen (1997), however, did not find similar results. They found that tax implications did not affect the timing of plan terminations.

Regulation Motives: Petersen (1992) studied the effect of the Tax Reform Act of 1986 on terminations. As mentioned earlier, this Act placed a 10 percent excise tax on all reversions. Using a subset of his sample (terminations occurring in 1986), he observed the effect of the tax (measured as the amount of the reversion that would be paid in taxes) on the probability of reversion and found that the tax reduced the number of terminations by 36 percent.

The Pension Plan Market

Statistics gathered by the United States Department of Labor (2001) indicate that from 1975 to 1995, defined contribution plans increased from 67.2 percent of all single employer pension plans to 90.2 percent. Also, the percentage of participants in single employer defined contribution pension plans increased from 31.3 percent to 59.3 percent. Looking at the time period and sample that more parallels this study, the percentage of defined contribution single employer pension plans with 100 or more participants increased from 50.7 percent of total plans in 1985 to 74.2 percent in 1995. Clearly, this indicates that there have been substantial changes in the market share controlled by defined benefit and defined contribution pension plans since ERISA.

The majority of studies that have tried to explain these changes in the pension plan market have looked at potential causes of the shift in isolation, focusing primarily on one of three areas: regulation, employment shifts or the introduction of 401(k) plans. The major findings of these studies are discussed below.

Regulation and Employment Shifts: Most studies focusing on regulation did not specifically include proxies for legislative changes, but made some assumptions based on

the results of their analysis of other variables affecting a firm's pension plan choice. For example, the study of Clark, McDermed and Trawick (1993) examined firms that offer at least one defined benefit plan in two separate periods. The authors found that of the 11.2 percent decline in defined benefit plans that occurred between 1985 and 1988, only 15.2 percent can be attributed to changes in the economy. The authors concluded that the remaining 84.8 percent of the change was due to legislation that increased administrative costs of defined benefit plans. This study updated the Clark and McDermed (1990) study which found a 15 percent decline in defined benefit plans between 1977 and 1985, of which approximately 21 percent was attributed to changes in the economy. The 1990 study concluded that the remaining 79 percent was the result of regulatory changes.

Ippolito (1995) did empirically examine the effect of legislative changes by comparing differences in the administrative costs of defined benefit and 401(k) plans over the ten-year period from 1981 to 1991 using data compiled by Hay-Huggins. The comparison showed a fairly consistent increase in the difference in administrative cost, but primarily and most substantially for small plans. This is consistent with the findings of a more recent study by Hustead (1998). Hustead examined the growth in the administrative costs of pension plans from 1981 to 1996 and found: (1) that the cost of administration of defined benefit plans as a percentage of payroll doubled during the time period and (2) the increase in administrative costs for smaller plans has been slightly larger than for larger plans. Ippolito concluded that the difference in costs would be expected to affect plan choice but does not empirically test this issue.

A study published in the same year by Kruse does empirically test the effect of the administrative cost difference in plans on pension plan choice. Kruse calculated the average administrative cost per plan participant for 1980 for both defined benefit and defined contribution plans. Using this cost difference in several regression models, the author found that administrative costs did play a factor in pension plan choice, primarily for firms adopting new plans. To illustrate, his findings suggested that if administrative costs were equal, 3.3 percent more newly adopted plans would have been defined benefit plans. This does not appear to be consistent with prior research, which suggests that administrative costs played a larger role in plan choice.

Kruse also included in his study variables capturing economic and workforce changes, which was the focus of many prior studies. For the most part, his results were consistent with prior research, which found that these changes accounted for anywhere from 21 percent [Clarke and McDermed (1990)] to 50 percent [Gustman and Steinmeier (1992)] of the shift in the pension plan market. One major difference in his results is that, unlike prior studies, he did not find changes in unionization rates to be significant.

Other Plans: Another factor thought to affect the shift in market share between defined benefit and defined contribution plans is the introduction of 401(k)s. Papke, Petersen and Poterba (1996) used survey data to determine if a firm's introduction of a 401(k) plan between 1986 and 1990 occurred at the expense of a firm's defined benefit plan(s). Only one firm in their sample reported adopting a 401(k) plan as the reason for terminating its defined benefit plan. Therefore, the authors concluded that 401(k)s typically supplemented firms' other pension plans rather than replaced them.

The findings of Papke et al. (1996) appear contrary to the findings of Ippolito (1995) and Papke (1996). These studies used empirical methods to examine changes in market share and the number of pension plans offered to determine whether 401(k) plans were replacing or substituting defined benefit plans. The studies cover roughly the same time period as the Papke et al. study but found different results. Both Ippolito and Papke concluded that the introduction of 401(k) plans did cause a reduction in the market share of other defined contributions plans, but these plans had a more substantial effect on the market share of defined benefit plans. To illustrate, Ippolito found that 73.6 percent of 401(k) plans' market share in 1988 came from defined benefit plans, with the remainder coming from other defined contribution plans. Papke's (1996) results indicated that adding a 401(k) plan increased the probability of termination of a defined benefit plan as well as decreased the number of participants in defined benefit plans.

A Different Approach: One author who takes a slightly different approach to explaining the change in market share between defined benefit plans and defined contribution plans is Petersen (1994). He examined a purely financial motive for the shift in market share. He hypothesized that since contributions to defined contribution plans are more flexible than those of defined benefit plans, firms may choose to adopt defined contribution plans to lower operating leverage. Controlling for many of the economic and workforce variables used in prior studies, Petersen found firms experiencing extremely low cash flow and firms with higher costs of financial distress are more likely to sponsor defined contribution plans.

Integrated Studies

Two recent studies that have attempted to integrate the termination and shift in market share literature are those of Papke (1996) and Kruse (1995). Expanding on her 1994 study, Papke examined the effect of changes in the number of 401(k) plans and other defined contributions plans on the number of defined benefit plans offered between 1985 and 1992. Her results suggested that adding a 401(k) or other type of defined contribution plan reduces the number of defined benefit plans offered.

Papke also used a probit model to determine the effects of changes in the number of 401(k) plans and other defined contributions plans on the probability that a defined benefit plan was terminated. She found that the presence or addition of either a 401(k) plan or other defined contribution plan increased the probability that a defined benefit plan was terminated by 4.4 and 4.2 percent, respectively. Based on these findings, the author concluded that 401(k) plans and other defined contribution plans are substitutes for defined benefit plans.

Kruse (1995) observed the basic patterns of firms' pension decisions from 1980 to 1986. Firms were placed into categories depending on whether they maintained at least one defined benefit (defined contribution) plan throughout the period, terminated all defined benefit (defined contribution) plans by the end of the period, began at least one defined benefit (defined contribution) plan by the end of the period, or had no defined benefit (defined contribution) plan at the beginning and end of the period. He found several interesting results: (1) most of the growth in defined contribution plans occurred in firms with no change in defined benefit status, (2) although there were more

terminations of defined contribution plans, the ratio of terminated plans to adopted plans was almost twice as high for defined benefit plans and (3) the total number of participants in defined benefit plans declined while the total number of participants in defined contribution plans increased.

CHAPTER 3: AN EXAMINATION OF OVERFUNED DEFINED BENEFIT PLANS

Introduction

This chapter of the study describes the data and methodology used to determine what motivates firms to terminate overfunded defined benefit pension plans (plans where the expected reversion is $1 million or more[10]) and if these motives vary across time. It also compares the results found in the empirical analysis to the reported reasons for termination to determine if they are empirically supported. Finally, it examines trends in replacement plans and organizational changes to determine if overfunded defined benefit pension plan terminations have contributed to the shift in market share that has occurred between defined benefit and defined contribution plans and if there are any outside forces that could potentially affect the termination decision.

As discussed earlier, one of the major contributions of this study is that it includes both plan level and firm level data in one analysis. The purpose is to create a more complete examination of the termination decision. Only one study has comprehensively examined both plan and firm level data. This study expands this work in two ways. First, by examining an additional plan level variable measuring the cost of maintaining the plan, the study is able to determine if regulatory changes and increases in the premium

[10] The expected reversion amount is used instead of the actual reversion amount in order to provide a cut-off point for the non-terminating plans.

charged by the PBGC has had any effect on the number of overfunded defined benefit terminations. Second, this study observes the variables of interest in multiple time periods to determine when the motives for termination first become evident. Multiple year logistic regression analysis has not been used in any prior termination study. Most studies only examined the variables of interest one year prior to termination. Others examined data further in advance of the termination event. The variables examined by Mittelstaedt (1989), for instance, were constructed as the observed value three years prior to termination or the change in value from time minus three to time zero. This study improves upon the models of previous studies by examining plan and firm data one, two and three years prior to the termination event. In doing so, the study is able to determine if there are any differences among the motives and when they first become apparent. This results in a more comprehensive analysis of the motives for termination of overfunded defined benefit pension plans. Also, by using a longer and more recent sample period as well as all the plans for which data are available, the results of this study should be more applicable to the population of plans.

Description of Data

The sample of plans used in this study comes from the population of plans filing the Form 5500. This form must be filed by firms for each plan that is subject to the Employee Retirement Income Security Act. This Act provides guidelines, rules and reporting and disclosure requirements for retirement plans. The Form 5500 provides information about the plan sponsor, plan type, participation levels and plan assets. It also advises the Internal Revenue Service of plan terminations and mergers.

Several screening procedures were applied to the data. Because firm-specific financial data is used in the analysis, only plans of firms that have financial data available on the Compustat Database are included. Second, only plans with 100 or more participants are used. This screening is necessary because for firms with less than 100 participants, the filing of the 5500 Form yearly is optional and therefore may create some bias. Third, only single-employer plans are used. Since this is a firm and plan level analysis, multiemployer plans are eliminated, as the decision to terminate these plans is likely not made by a single firm. Fourth, firms that do not have useable data or that have missing data for a particular year used in this study are excluded. Finally, after rediscounting plan liabilities using a common discount rate[11], plans where the potential reversion is less than $1 million were eliminated. These plans are the focus of the analysis in Chapter 4.

In order to maximize the number of plans in the sample, several data corrective steps were employed. First, due to budgetary constraints, for some years limited information was entered on the Form 5500. For example, detailed liability information and interest rates were not entered in the data files from 1986 through 1991. Later, the PBGC did enter some of the missing data, but not for all years or all plans. To ensure that the maximum number of plans were included in the sample, the missing data files were used to update the primary files. This substantially increased the number of non-terminating plans in the sample. More importantly, it nearly tripled the number of terminating plans in the sample.

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[11] The rediscounting procedure is described in detail in the Methodology Section.

In addition to the Form 5500 data, the PBGC also provided a list of plan terminations based on firm filings of the Standard Termination Notice for Single Employer Pension Plans. This form is filed by all firms terminating a defined benefit pension plan that has assets sufficient to cover all benefit liabilities. Since this data is generally deemed more accurate than the Form 5500 data, it is used to verify that a plan did terminate and that the termination year was correctly reported. Also, plans of public firms that filed the Standard Termination Notice but did not record this information on the Form 5500 were moved to the termination sample.

Finally, since some of the motives for termination are deemed financial in nature, data from Compustat was matched with the Form 5500 data. This data was matched based on CUSIPs. The IRS did not require firms to provide CUSIPs on the Form 5500 until 1988. As a result, for 1987 plans for which later Form 5500 filings were not able to match CUSIPs, the Compustat search function was used. This information was hand-entered into the primary file, and then matched with financial data from Compustat. Also, plans of public firms that did not initially match with any Compustat data were examined to determine if a match could be found. In some cases, the CUSIP was recorded incorrectly or was missing from the data set. This information was updated and then matched with the appropriate financial data.

Table 3.1 provides information on the number of plans to be used in the study. After removing plans with missing data, the final sample contains 72 terminating plans and 1,991 non-terminating plans. Examining the spread of terminations over the years reveals a jump in terminations in 1990, increasing through 1992. The most terminations,

21, occurred in this year. Starting in 1993, the number of terminations began to decline considerably with only one large overfunded standard termination occurring in 1995 and 1996 and none in 1997. This closely resembles the pattern of all standard terminations as compiled by the PBGC, except for the early years, which showed a more level number of terminations for all standard terminations. The primary difference between the sample used in this study and all standard terminations is that all standard terminations include plans of all sizes, as measured by the number of participants, plans of both public and private firms, and plans of varying funding status (As mentioned earlier, to qualify as a standard termination, the plan only has to have assets sufficient to satisfy its liabilities. Our sample is limited to plans were the expected reversion is $1 million or more.).

There are 40 unique firms in the terminating sample and 488 unique firms in the non-terminating sample. An examination of the number of firms and the number of plans in the sample by year indicates that firms typically have more than one plan. Over the sample period, the average number of plans per firm per year is slightly more than 1.5, and ranges from a low of one in 1995 to a high of approximately two in 1992.

Observing the number of firms relative to the number of plans in the termination sample indicates that firms typically terminate multiple plans in a given year. This can also be seen by examining the firm termination rate, shown in Table 3.2. The average termination rate, which is defined as the average number of plans a firm terminates relative to the total number of plans it sponsors in a given year, is 2.9 percent, with a high

Table 3.1: Summary Statistics for Overfunded Plans

Number of Plans

Year	*Terminating*	*Non-terminating*	*Total*	*Percent*
1988	3	83	86	4.17%
1989	4	111	115	5.57%
1990	12	332	344	16.67%
1991	16	442	458	22.20%
1992	21	580	601	29.13%
1993	9	249	258	12.51%
1994	5	138	143	6.93%
1995	1	28	29	1.41%
1996	1	28	29	1.41%
	72	1991	2063	100.00%

Industry Statistics

Division	*Number*	*Percent*
Mining	68	3.30%
Construction	5	0.24%
Manufacturing	1624	78.72%
Transportation, Communications, Electric, Gas and Sanitary Services	161	7.80%
Wholesale Trade	61	2.96%
Retail Trade	50	2.42%
Services	29	1.41%
Public Administration	65	3.15%
	2063	100.00%

of 3.91 percent occurring in 1990. Another way to examine this issue is to observe the number of firms that terminate all if its plans in a given year compared to the number of firms that terminated only a portion of their plans. Of the 1168 firm observations, slightly less than two percent terminated all if its plans in a given year while approximately two

Table 3.2: Firm Statistics for Overfunded Plans

		Number of Firms		
	Full Sample	*Terminating*	*Non-Terminating*	*Plans per Firm*
1988	64	3	62	1.3438
1989	80	2	80	1.4375
1990	186	10	180	1.8495
1991	228	7	226	2.0088
1992	272	11	268	2.2096
1993	177	7	174	1.4576
1994	106	4	103	1.3491
1995	29	1	28	1.0000
1996	26	1	25	1.1154
	1168	46	1146	1.5301

		Termination Category		
	All	*Some*	*None*	*Termination Rate*
1988	2	1	61	3.65%
1989	0	2	78	1.16%
1990	6	4	176	3.91%
1991	2	5	221	1.86%
1992	4	7	261	2.54%
1993	3	4	170	2.69%
1994	3	1	102	3.02%
1995	1	0	28	3.45%
1996	1	0	25	3.85%
	22	24	1122	2.90%

percent terminated some portion of their plans in a given year. The remaining 96 percent, did not terminate any plans in a given year.

Industry dummies were constructed based on 2-digit SIC Codes. For the purpose of general discussion, plans in each major industry group are aggregated to the division level. Plans in the Finance, Insurance and Real Estate Division are deleted from the

sample. These firms are removed for two reasons: (1) the financial information provided by these types of firms varies significantly from that provided by other firms to Compustat and (2) these firms face a distinctly different regulatory environment than firms in other industries. These firms were removed from the sample in at least one prior study as well [Stone (1987)].

Table 3.1 provides the industry statistics for the sample. Nearly 80 percent of the firms are in the Manufacturing Division. This is nearly the exact percentage of manufacturing firms in the Hamdallah and Ruland (1986) study. In their study, of the 40 firms included, 31 were of firms in the manufacturing industry. The next largest division is Transportation, Communications, Electric, Gas and Sanitary Services which represents almost 8 percent of the sample. The division represented by the fewest number of plans is that of Construction with less than one percent of the plans being sponsored by firms in this industry.

Methodology

The focus of the study is to determine what motivates firms to terminate overfunded defined benefit pension plans. The primary analysis focuses on the termination decision. Since this decision is qualitative in nature, logistic modeling is used. The dependent variable is regressed on the explanatory variables and the cumulative normal function is used to force predicted values to fall between zero and one. As a result, the predicted values can be interpreted as the probability that the plan will terminate.

Before the final screening is done to remove plans with potential reversions of less than $1 million, plan liabilities are rediscounted using a common discount rate. Since firms have some discretion in choosing discount rates, it is possible that they may select a rate based on their financial position. For example, Bodie, Light, Morck and Taggart (1987) found that more profitable firms choose a lower discount rate in order to overstate pension liabilities. As a result, they are able to increase their contributions to their pension plans and benefit from the tax advantages.

Feldstein and Morck (1982) discuss this issue and conclude that rediscounting to a common rate may eliminate possible overstatements and understatements of liabilities that may be caused by the varying interest rates used by firms. These overstatements and understatements could potentially affect the classification of a plan as overfunded and therefore its inclusion or exclusion from the sample. Rediscounting should result in a more accurate classification scheme and therefore lend more validity to the results found in this study. Rediscounting was used in several prior terminations studies, including those of Stone (1987), Mittelstaedt (1989) and Petersen (1992).

Rediscounting is done by averaging the discount rate each year for all plans for which usable data is available. Then, the following formula is used to determine the rediscounted liability amount (RDL):

$$RDL = RL\ (ADR/CR),$$

where RL = reported liabilities, ADR = actual discount rate used and CR = common rate.

After the plan liabilities have been rediscounted and plans with potential reversions of less than $1 million are eliminated, the sample is divided into two categories, plans that terminated during the period and plans that never terminated. All plans that terminated are used in the model. For these plans, time zero is the termination year and the variables of interest are examined one, two and three years prior to termination (as well as one, two and three years following termination in the means analysis).

For plans that never terminated, each plan is included in the model only once, with time zero being randomly selected. This is done by creating a unique list of plans and assigning each plan a number. Then, a random generation program is used to select a predetermined number of plans for a given year. This is done without replacement. The number of non-terminating plans in each year is based on the number of terminations that occurred in that year. For example, as shown in Table 3.1 there were 21 terminations in 1992, which is 29.13 percent of the total number of terminations in the sample. Therefore 580 non-terminating plans were randomly assigned a time zero of 1992 which is 29.13 percent of the non-terminating sample. For these plans and the plans that terminated in 1992, the model which examines the variables of interest one year prior to the termination event would use 1991 financial and plan level data.

The purpose of the random assignment method matching the proportion of terminating and non-terminating plans in each year is to try to minimize the effect of any economic and/or firm-specific factors that may occur in any given year. This procedure, or one similar to it, is used in prior studies examining terminations of pension plans

including that of Thomas (1989) and in insurance solvency studies such as that of BarNiv and Hathorn (1997).

Prior to any analysis, the data was examined for possible econometric problems that may affect the validity of the results obtained. First, a correlation matrix was constructed to identify possible correlations among the independent variables. Using a cut-off of +/-.50, only the administrative cost and normal cost variables show any signs of high correlation (The correlation between these variables was .67).[12] To further test for multicollinearity, tolerance statistics were calculated for all variables using the maximum likelihood algorithm. This process adjusts the linear combinations of the variables by the weight matrix before running the regression to calculate the tolerance statistics. Using a weighted least squares regression is a more precise process for evaluating multicollinearity and could diagnosis multicollinearity that may be missed by the unadjusted process. Using a cut-off of .40, multicollinearity was present for several variables. To ensure that the results reported do accurately reflect the true relationships between the independent and dependent variables, each variable that failed the tolerance test was alternately dropped from the model and the model re-run. If the results obtained in these models are consistent with the results obtained when all variables are examined together, then if any multicollinearity does exist among the variables, it is not altering the relationships observed between the independent and dependent variables.

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[12] These variables also fail subsequent multicollinearity tests and, as discussed later in this section, were alternately dropped from the model to determine if the correlation was affecting the results obtained for the other variables.

Next, the data was examined for potential outliers. Univariate statistics as well as the residual values of the variables were calculated to identify outliers. The variable values were truncated at the 1^{st} and 99^{th} percentiles to ensure that outliers did not drive the effects of the results observed. All of the models were also run without any outlier corrections. The results of the truncated models are reported in the Results Section. Any differences between the results obtained in the non-truncated models and the truncated models are discussed in the summary provided at the end of the section.

Prior to constructing the logistic regression models, a means comparison of the sample variables is conducted. The variables of interest are observed one, two and three years prior to time zero and then one, two and three years following time zero for both the terminating plans and non-terminating plans. The purpose of this analysis is to determine if there are systematic differences between firms of terminating plans and firms of non-terminating plans and if these differences persist following the termination event.

In the next analysis, several logistic models are constructed. For t_{-1}, t_{-2} and t_{-3}, full models containing all data years are constructed to determine what motives for termination of overfunded defined benefit plans are evident for the entire sample period. Then, the data is divided into sub-periods and the same analysis is done. The primary purpose of examining sub-periods is to determine if motives for termination have changed over time. The sub-periods are 1988 to 1992 and 1993 to 1997. Next, as discussed above, variations of the primary model are constructed to test the robustness of the results. These models alternately drop variables that fail the tolerance test to determine if the results found for the other variables are consistent.

In the logistic regression models, the dependent variable for all of the models is equal to one in the case where a plan is terminated and zero otherwise. The basic model is defined as:

Termination = f(financial variables, expropriation variables,
tax variables, regulation variables, control variables)

The specific variables and the predicted signs for the model are listed in Table 3.3. The hypotheses for each category of variables as well as the specific variables to be used are discussed in the following section.

After the regression results are obtained, they are compared with the frequency of the reported reasons for termination to determine if the reported reasons for plan termination are empirically supported. For example, if the reported reason for termination that occurs with the greatest frequency is adverse business conditions, it is expected that the financial variables will be significant in the regression model.

Finally, the successor plan information is analyzed to determine the role termination of overfunded defined benefit plans have played in the shift in market share that has occurred between defined benefit and defined contribution plans. It is expected that if overfunded defined benefit plans that terminated were most often not replaced or replaced with defined contribution plans, then termination of these plans likely did contributed to the increase in market share of defined contribution plans.

Development of Hypotheses for Regression Models

This section of the study develops the hypotheses to be tested related to the motives for termination of overfunded defined benefit pension plans. The study hypothesizes that motives for termination would result from financial, expropriation, tax or regulatory incentives. First, each motive is discussed and related to prior literature. The variables for testing the motives are also defined and the predicted signs are reported. This information is summarized in Table 3.3. Second, the categories of reasons for plan termination provided to the PBGC are described and the variables that should be significant in the logistic model if these are truly the reason for termination are discussed. Lastly, successor plan choices and organizational changes are presented and related to the results found in the logistic regression models as well as the reported reasons for termination.

Financial Motivations: A firm may have two main financial reasons to terminate an overfunded defined benefit pension plan. First, because pension plans represent financial commitments on the part of the firm, if the firm is experiencing financial distress, terminating an overfunded defined benefit pension plan relieves the firm of future financial responsibility. Also, money previously used to fund pension liabilities would then be available for other uses by the firm. Second, termination of overfunded defined benefit pension plans also provides an infusion of cash to the firm. This money can be used to reduce debt or as an internal means of financing.

Table 3.3: Variable List and Predicted Signs for Overfunded Plans

Variable	*Definition*	*Expected Sign*
INCRATIO	Net income/total firm assets	-
FARATIO	Fixed assets (plant, property and equipment)/total firm assets	-
NDPRATIO	Net purchases of firm's own debt/total firm assets	not sign/-
NSPRATIO	Net purchases of firm's own stock/total firm assets	not sign/-
ACQRATIO	Expenditures on acquisitions/total firm assets	not sign/-
LEVER	Debt/total firm assets	+
DIVDUM	Dummy variable=1 if increase in dividends, 0 otherwise	not sign/-
FEDTAX	Dummy variable=1 if federal taxes paid, 0 otherwise	-
TLCARRY	Dummy variable=1 if positive, 0 otherwise	+
VSTRATIO	Number of vested participants/total participants	+
ADEXEQTY	Administrative expense/firm equity	+
NCSTEQTY	Normal cost/firm equity	+
LNASSET	Log of firm assets	?

The most recent study considering this financial reason for termination is that of Hsieh, Ferris and Chen (1997). They found that firms were more likely to terminate a defined benefit pension plan when cash was needed to honor short-term liabilities. The results of this study were consistent with prior research in this area.

Hsieh, Ferris and Chen (1997) also found that firms experiencing less financial distress used alternative methods of generating cash flow while those experiencing greater financial distress were more likely to terminate a plan. This result is consistent with the pecking order of new financing developed by Myers and Majluf (1984). Their study suggested that firms choose financing methods based on the level of cost and risk. Therefore, firms prefer internal to external financing. Since overfunded defined benefit pension plans can be viewed as financial slack, termination of these types of plans can be considered a means of internal financing.

Several other studies have considered this issue as well, suggesting that during periods of financial distress, when external financing may be more costly or not at all attainable, termination of overfunded defined benefit plans is even more likely. Petersen (1992) is one such study. Using various financial measures, he found that firms experiencing a decline in earnings were more likely to terminate their overfunded defined benefit plans. The author's results were consistent with prior research in the area [Thomas (1989), Mittelstaedt (1989) and Stone (1987)].

To test these hypotheses, measures of firms' financial condition and ability to access the capital markets are examined. The profitability measure included is net income scaled by total firm assets. This measure is commonly used to assess financial condition. If a termination is motivated by financial distress, inverse statistical significance of this variable in the years prior to termination is expected. Changes in dividend payments, measured using a dummy variable equal to one if dividends were increased from the prior year or zero otherwise, is also included. Petersen (1992) uses

this variable, hypothesizing that it is a proxy for management's predictions of future earnings. If management feels that the firm is doing well, it is likely to increase dividends. However, if management feels the firm is experiencing financial difficulty, dividend payments would likely remained fixed, or possibly decrease.

Petersen also discusses the importance of controlling for firm's other financing options when examining the termination decision. This is because freezing or restricting spending is another way in which firms can reduce cash outflows. Petersen's model incorporates a set of variables designed to observe changes in firms' spending. If a firm is experiencing financial distress, it is expected that the firm would either reduce its spending or maintain its current levels of spending. Those variables considered by Petersen that are included in this termination model are net purchases of the firm's own debt and stock and expenditures on acquisitions, all scaled by total firm assets. These variables are expected to either be insignificant or significant and negatively related to the probability of termination. As noted by Petersen, a positive and significant effect would indicate that firms are not using pensions to generate financial slack that can be withdrawn at some later point.

In addition, Petersen examines the normal cost of maintaining the defined benefit pension plan. Since this is the amount of money the firm must add to the plan each year to ensure that its assets are sufficient to honor its liabilities, this amount represents cash 'lost' to the firm. If a firm is experiencing financial distress, termination of the pension plan would allow money previously earmarked for pension funding to be used for other

purposes within the firm. As a result, this variable is expected to be positively related to the probability of termination.

Access to the capital market is measured by examining each firm's level of fixed assets relative to total firm assets and the amount of debt it already holds (calculated as total firm debt to total firm assets). As theorized by Petersen, if a firm has higher levels of fixed assets, its ability to access external capital may be greater because it is able to use those assets as collateral. Also, as hypothesized in almost all prior termination studies, if a firm is already highly leveraged, its ability to access capital may be restricted or the cost associated with securing additional debt may be unaffordable. As a result, a highly leveraged firm is predicted to be more likely to terminate a pension plan to gain access to excess funds or reduce its liabilities and potentially reduce the need or the cost of external capital.

Expropriation Motivation: Both managers and stockholders can potentially benefit from the termination of an overfunded pension plan. This potential benefit stems from the design of the pension contract. Ippolito (1985) found that a firm's promise to pay real pension benefits upon the retirement of a worker (back-loading of compensation) creates an implicit contract under which the worker loses if he leaves the firm. He further expands this theory in 1986, finding that since workers may accept a lower wage because of the promise of future income upon retirement, firms can gain by terminating pension plans as the future retirement benefits are no longer a liability. This gain is at the expense of workers.

The literature related to expropriation has yielded mixed results. One study that empirically examined this issue is that of Petersen (1992). Using variables measuring the types of workers participating in defined benefit pension plans and the types of plans sponsored, he found that more generous plans and plans with more vested and retired employees (plans with the greatest pension bond as explained below) were more likely to terminate. Thomas (1989) also examined the issue of expropriation. Using a measure of the proportion of participants that are vested, he did not find support for this type of expropriation occurring, though he did find support for expropriation of wealth from bondholders and the PBGC to stockholders. This type of expropriation, however, is outside of the scope of this study and will not be considered here.

Literature focusing on who receives the benefit of plan termination also considered whether or not expropriation of wealth occurred by examining whether or not stockholders experienced abnormal returns following the announcement of a defined benefit plan termination [Alderson and Chen (1986), Moore and Pruitt (1990)]. Again, findings have been inconsistent. Most early studies found stockholders did experience abnormal returns, while more recent studies, even those covering the same time period and in some cases using the same sample, have not.

This study uses the ratio of vested participants to total participants to determine if expropriation of wealth from workers to managers and stockholders is a motive for termination. As in prior studies, this variable is used to measure the size of the pension bond. Since vested participants are the employees to which the firm already owes benefits, termination of the plan would freeze benefits at their current levels and prevent

the accumulation of higher benefits, and therefore an even greater liability for the firm. This is possible because for vested participants, the longer the participants are in the plan, the greater their final benefit amount since this amount is typically based on salary, years of service or both.

Tax Motivations: A firm's tax status can affect its decision to terminate an overfunded defined benefit plan. For example, if a firm has tax loss carryforwards, they can be used to reduce taxable liability on future income. Because the reversion amount received by the firm would be considered income and therefore subject to taxes, reversion of an overfunded pension plan could increase a firm's tax liability. If the firm has tax loss carryforwards, the taxable amount of the reversion can be reduced. In this case, the firm will keep more of the reversion amount.

Another tax consideration is a firm's marginal tax rate. Firms with low marginal tax rates experience lower tax liability, as an additional dollar of taxable income results in lower tax payments than it would for firms with higher marginal tax rates. As a result, termination of an overfunded defined benefit plans for these firms would result in lower tax liability than for firms with higher marginal tax rates.

Several studies, including those of Hamdallah and Ruland (1986) and Clinch and Shibano (1990), considered tax motives for termination. These studies focus on tax loss carryforwards and the level of federal tax payments. Hamdallah and Ruland found that of their matched sample of 80 firms, those that terminated their overfunded pension plans had tax carryforwards relative to those that did not. The results of the Clinch and Shibano study were consistent with this finding. They examined a sample of firms that

covered a slightly longer period and found a significant relationship between the reversion decision and tax benefits (level of federal tax payments and tax loss carryforwards). These results support the theory that a firm with tax loss carryforwards can use them to offset the income received from the reversion, or essentially reduce the amount of the reversion that is subject to taxation. It also supports the potential link between a firm's marginal tax rate and termination of an overfunded defined benefit plan.

As used in most prior studies considering tax motives for plan termination, this study uses a dummy variable equal to one if the firm has tax loss carryforwards, zero otherwise. A separate dummy variable is constructed for federal tax payments. This variable is equal to one if the firm paid federal taxes in that year, zero otherwise. If the theories are correct, it is expected that the presence of tax loss carryforwards will be directly related to the probability of termination of overfunded defined benefit plans and the presence of federal tax payments will be inversely related to the probability of termination.

Regulation Motivation: The area of regulatory change affecting a firm's decision to terminate a defined benefit pension plan examined by this study is related to the cost of maintaining the plan. The PBGC originally instituted a flat premium fee of $1 per participant for all defined benefit pension plans to guarantee workers benefits. Over the years, the fee has increased to its current level of $19 per plan participant, with an additional variable amount added for underfunded plans.

In order to measure the effect on terminations of increases in the cost of maintaining defined benefit plans, a variable that measures the administrative cost

relative to equity is included.[13] Two increases in the PBGC premium occurred during the period covered by this study, one in 1987 and another in 1990. It is predicted that these increases in PBGC premiums as well as legislation that has increased the administrative costs of maintaining a defined benefit plan will increase the probability of termination of overfunded defined benefit pension plans. The effect of these regulatory changes have not been empirically examined in any of the prior literature.

Control Variables: To best determine the effect of the variables of interest on the probability of termination, several control variables are used. Size is controlled for in all of the models. Also, firm and year dummies are included to capture any firm-specific and/or economic effects that may occur during the sample period.

Summary Information

Reasons for Termination: The PBGC provides several reasons for plan termination that can be selected by the firm at the time the standard termination form is completed. It also allows the firm to hand enter a reason if the reason for termination is not on the list. The reasons listed are adverse business conditions, high administrative costs, high benefits costs, and program restructuring. A frequency table is constructed based on firms' responses. It is expected that those reasons reported with the greatest frequency will be empirically supported by the results of the logistic model. For example, if adverse

[13] Total administrative cost is used instead of PBGC premiums because starting in 1988, the premiums where included in the salary and allowances category of expenses instead of being listed as a separate category. By using total administrative cost, the study is also able to capture the effect of other legislation that has increased the cost of maintaining a defined benefit plan that were passed during the sample period.

business conditions is the reason for termination listed most frequently, then it is expected that the financial variables will be significant in the regression model. On the other hand, if high administrative or benefits costs are listed most frequently, then the administrative cost variable is expected to be significant.

Shift in Market Share: Replacement plan trends were examined by Thomas (1989). He looked at replacement plans of terminated defined benefit plans, hypothesizing that expropriation occurs if the replacement is a defined contribution plan. The author notes that expropriation could also occur if the replacement plan is a defined benefit plan but does not allow for full credits for service. Observing trends in replacement plans between 1980 and 1985, he does not find evidence of expropriation. He finds that although in early years, 100 percent of all replacements were defined contribution plans, in subsequent years, replacement plans were split almost equally between defined benefit and defined contribution plans.

Though replacement plan information may indicate whether or not expropriation has occurred, it also offers some insight into the effect of overfunded defined benefit plan termination on the change in market share that has occurred between defined benefit and defined contribution plans. If a firm replaces a terminated plan with a plan that has less strict contribution and funding requirements (as would be the case if a defined benefit plan is replaced with a defined contribution plan) then expropriation is likely a motive. Though no strong conclusions can be drawn by examining trends, it is expected that if termination of overfunded defined benefit plans have played a significant role in the

increase in market share of defined contribution plans, then no replacement plan or defined contribution plan replacements will occur with the greatest frequency.

Results

This portion of the study summarizes the results of the various analyses of overfunded defined benefit plans. First, the means of the variables of interest for both terminating plans and non-terminating plans are reported. Next, means comparisons between these two groups of plans are discussed. Third, the results of the regression models examining data one, two and three years prior to termination are reported and then collectively summarized. Finally, summary information based on firms' reported reason for termination, successor plan information and organizational changes is presented and related to the results found in the empirical model.

Means: The means of the variables of interest are provided in Table 3.4 (before time=0 data) and Table 3.5 (after time=0 data) and discussed in this section. The results of the means comparisons and the regression models follow. Examining first means of the variables for the terminating sample, there is a steady decline in income and spending is generally reduced leading up to plan termination. The leverage measure fluctuates over this time period. Leverage first increases but then decreases prior to termination. Finally, fewer firms are increasing dividends leading up to the termination event. This generally suggests that these firms are experiencing financial distress prior to the termination of their overfunded defined benefit pension plans. Also, normal costs and administrative costs are increasing as well as the number of firms that have tax loss carryforwards. The

Table 3.4: Means for Overfunded Plans Before Time=0

Terminating Plans

Variable	*Minus 3*	*Minus 2*	*Minus 1*
INCRATIO	0.0593	0.0373	0.0154
FARATIO	0.3899	0.3848	0.3665
NDPRATIO	-0.0235	-0.0034	0.0083
NSPRATIO	0.0123	-0.0144	-0.0020
ACQRATIO	0.0331	0.0304	0.0211
LEVER	0.6627	0.7128	0.6743
DIVDUM	0.7500	0.5000	0.5000
FEDTAX	0.7857	0.6957	0.7778
TLCARRY	0.0714	0.1087	0.1806
VSTRATIO	0.4659	0.4527	0.4082
ADEXEQTY	0.0000	0.0002	0.0004
NCSTEQTY	0.0003	0.0010	0.0011
LNASSET	7.7004	7.5741	7.5732

Non-Terminating Plans

Variable	*Minus 3*	*Minus 2*	*Minus 1*
INCRATIO	0.0471	0.0414	0.0331
FARATIO	0.4145	0.4165	0.4022
NDPRATIO	-0.0063	-0.0066	0.0008
NSPRATIO	0.0003	-0.0044	-0.0049
ACQRATIO	0.0201	0.0201	0.0139
LEVER	0.6180	0.6255	0.6274
DIVDUM	0.4975	0.4928	0.4498
FEDTAX	0.8017	0.7886	0.7746
TLCARRY	0.1172	0.1466	0.1637
VSTRATIO	0.4428	0.4484	0.4386
ADEXEQTY	0.0004	0.0002	0.0003
NCSTEQTY	0.0021	0.0011	0.0010
LNASSET	7.0342	7.0548	7.0651

Table 3.5: Means for Overfunded Plans After Time=0

Terminating Plans

Variable	*Plus 1*	*Plus 2*	*Plus 3*
INCRATIO	0.0244	0.0203	0.0442
FARATIO	0.3569	0.3566	0.3565
NDPRATIO	-0.0056	0.0193	0.0024
NSPRATIO	0.0001	0.0008	-0.0006
ACQRATIO	0.0109	0.0118	0.0267
LEVER	0.6661	0.6720	0.6766
DIVDUM	0.4030	0.4603	0.6508
FEDTAX	0.8806	0.8254	0.8413
TLCARRY	0.1493	0.1905	0.2063
LNASSET	7.8610	7.9020	7.9394

Non-Terminating Plans

Variable	*Plus 1*	*Plus 2*	*Plus 3*
INCRATIO	0.0267	0.0353	0.0472
FARATIO	0.3959	0.3898	0.3875
NDPRATIO	0.0010	0.0015	-0.0044
NSPRATIO	-0.0070	-0.0024	0.0015
ACQRATIO	0.0163	0.0183	0.0190
LEVER	0.6418	0.6395	0.6348
DIVDUM	0.4349	0.4399	0.4640
FEDTAX	0.7719	0.7926	0.7795
TLCARRY	0.1831	0.2000	0.2022
LNASSET	7.2344	7.2907	7.3409

level of fixed assets and federal taxes paid remains fairly constant while the number of vested workers declines.

For non-terminating firms, income drops some but spending on debt purchases increases. There is a decline in the number of firms paying federal taxes and an increase

in the number of firms with tax loss carryforwards. Also, normal costs decrease while administrative costs and the percentage of vested workers remain fairly constant. Together, these results are not consistent with a firm experiencing financial distress.

Means Comparisons: Table 3.6 reports the results of the means comparisons of the variables of interest for the two groups that are discussed in the section. The results of the regression models are discussed in the following section. Using a significance level cut-off of 10%, the results of the means comparisons indicate that terminating plans spent more on stock purchases and were more likely to increase dividends three years prior to termination. These results could indicate that firms' that terminated their overfunded defined benefit plans were doing so because of cash shortfalls resulting from overspending. Also, firms that terminated plans were less profitable and more highly leveraged than those that did not. Collectively, these results indicate that, prior to termination, firms that terminated plans were in worse financial condition than firms that did not terminate their plans. Just prior to termination, there were no significant differences between terminating and non-terminating plans relative to cost of maintaining the plans or the level of contributions required for plans. The results of the means comparisons also indicate that in the three years leading up to the termination event, firms of terminating plans were significantly larger than those that did not.

Following the termination event, firms of terminating plans were no longer less profitable and more highly leveraged than non-terminating firms. Examining the spending variables, terminating firms spent more on stock purchases but less on

Table 3.6: Means Comparison for Overfunded Plans

Variable	*Minus 3*	*Minus 2*	*Minus 1*	*Plus 1*	*Plus 2*	*Plus 3*
INCRATIO	0.2478	0.6392	0.0818	0.7297	0.1439	0.6564
FARATIO	0.5288	0.3037	0.1396	0.1172	0.1942	0.2222
NDPRATIO	0.3584	0.7430	0.3129	0.1947	0.0102	0.5888
NSPRATIO	0.0628	0.1650	0.5492	0.0036	0.4642	0.5262
ACQRATIO	0.2872	0.3447	0.1736	0.0420	0.0536	0.4154
LEVER	0.5081	0.0691	0.1799	0.4089	0.3789	0.2399
DIVDUM	0.0086	0.9233	0.4006	0.6054	0.7484	0.0035
FEDTAX	0.8347	0.1325	0.9494	0.0100	0.5275	0.2440
TLCARRY	0.4572	0.4741	0.7039	0.4813	0.8527	0.9365
VSTRATIO	0.5886	0.8955	0.2465	N/A	N/A	N/A
ADEXEQTY	0.0001	0.8500	0.3926	N/A	N/A	N/A
NCSTEQTY	0.0001	0.9272	0.8241	N/A	N/A	N/A
LNASSET	0.0384	0.0424	0.0158	0.0036	0.0055	0.0058

Values are p-values produced from t-tests.

acquisitions than non-terminating firms following the termination event. These results suggest that the excess assets recaptured by these firms at termination were used to fund purchases and reduce debt. The firms of terminating plans were also more likely to have paid federal taxes in the year immediately overfunded defined benefit plans. This result is likely due to the recapture of the excess assets increasing the net income of the firms of terminating plans immediately following termination. Three years following the termination event, more firms of terminating plans increased dividends compared to those of non-terminating plans. This could potentially indicate management's belief that the firm's future is favorable and that the firm is no longer experiencing financial distress. Finally, as in the years leading up to the termination event, the firms of terminating plans were significantly larger than the firms of non-terminating plans.

Model Results for Time=-1: As shown in Table 3.7, the regression results of the model examining data one year prior to the termination event support the financial, regulatory and expropriation motives for termination, though these results vary by time periods. Examining first the results of the full model, the income variable is significant and negative, indicating that firms experiencing income shortfalls are more likely to terminate their overfunded plans than firms that are not. The fixed assets variable is also significant and negative, indicating that firms with greater access to external capital are less likely to terminate their plans.[14] Finally, the acquisition ratio is significant and positive. This result suggests that firms that are increasing spending on acquisitions are more likely to terminate. Since this is the only spending variable that is significant, it may be possible that this effect is driven by organizational changes. This issue is discussed further later in the chapter.

When the sample is divided into sub-periods, it can been seen that the motives for termination differ across time periods. In the earlier period, the income variable and dividend dummy are significant and negative. This suggests that firms experiencing inancial difficulty are more likely to terminate their overfunded defined benefit pension plans. The vested variable is also significant and negative. These results together support the financial motive for termination in the early sub-period but not the expropriation

[14] Six of the variables in the model fail the tolerance test, including the administrative cost and normal cost variables (These variables also indicated some pairwise correlation based on the results of the correlation matrix.). Models run with these variables alternately dropped yielded results consistent with those reported above. The only difference was in the model that dropped size. In this model, the significance level of the fixed asset ratio dropped to 15%.

Table 3.7: Results for Overfunded Plans (Minus 1 Data)

	Full Model	*1988-1992*	*1993-1997*
INCRATIO	-9.9811 *	-7.5355 **	-10.4855
FARATIO	-2.6795 ***	-2.3955	3.3108
NDPRATIO	4.4020	0.9225	30.4164 *
NSPRATIO	0.9239	-0.1802	15.2130
ACQRATIO	7.5808 ***	4.9393	31.6848 *
LEVER	-1.7215	-1.5530	-5.9399
DIVDUM	-0.7139	-1.1719 **	0.3158
FEDTAX	-0.2664	-0.2865	2.3527
TLCARRY	0.0905	0.3332	-0.8877
VSTRATIO	-0.5299	-1.4776 ***	4.3525 ***
ADEXEQTY	29.7923	-215.7000	1489.9000 **
NCSTEQTY	35.5045	82.1542	101.9000
LNASSET	0.2290	0.3227 ***	0.2778
R^2	0.3882	0.3910	0.5159

INCRATIO=net income/total firm income, FARATIO=fixed assets/total firm assets, NDPRATIO=net debt purchases/total firm income, NSPRATIO=net stock purchases/total firm income, ACQRATIO=expenditures on acquisitions/total firm income, LEVER=debt/total firm assets, DIVDUM=dummy variable equal to 1 if increase in dividends, 0 otherwise, FEDTAX=dummy variable equal to 1 if federal taxes paid, 0 otherwise, TLCARRY=dummy variable equal to 1 if positive, 0 otherwise, VSTRATIO=vested participants/total plan participants, ADEXEQTY=administrative costs/equity, NCSTEQTY=normal cost/total firm assets, LNASSET=Log of firm assets

* Significant at .01 level
** Significant at .05 level
*** Significant at .10 level

motive. Finally, the size variable is significant and positive, implying that larger firms are more likely to terminate than smaller firms.

Examining the results of the later sub-period, the vested ratio is now significant and positive. Since vested workers have the greatest pension bond, this result suggests that expropriation is a motive for termination during this period. The administrative cost variable is also significant and positive, indicating that plans that are more costly to maintain are more likely to be terminated. This result supports the regulatory motive for termination. The Odds Ratio for this variable is extremely large, suggesting that the probability of termination is highly sensitive to changes in administrative cost.

Model Results for Time=-2: Table 3.8 reports the results for the models examining data two years prior to the termination event. The results of the full model support both the financial and the tax motives for termination. The fixed assets ratio is significant and negative, indicating that firms that are more likely have access to external capital are less likely to terminate. The federal tax dummy is significant and positive. The Odds Ratio for this variable suggests that firms that have positive tax payments in year minus two are 70 percent less likely to terminate than plans that did not.[15]

Examining the early sub-period model for the –2 sample, the tax motive is still evident; however, the financial motive is not. As in the early sub-period for the –1

[15] Several variables in this model fail the tolerance test. In the alternate models run for this sample, in only one was there any substantive change in the results (the fixed asset variable was no longer significant) obtained compared to those reported here.

Table 3.8: Results for Overfunded Plans (Minus 2 Data)

	Full Model	*1988-1992*	*1993-1997*
INCRATIO	1.8671	-7.0722	11.1196
FARATIO	-3.4731 ***	-2.3841	-3.0076
NDPRATIO	3.0951	6.5675	-2.2537
NSPRATIO	-7.4044	-3.9070	-5.1325
ACQRATIO	3.6847	4.5549	-0.3984
LEVER	-0.9676	0.0027	1.6403
DIVDUM	-0.9132 ***	-1.0966	0.3444
FEDTAX	-1.2173 **	-1.2879 ***	-0.3513
TLCARRY	-0.6218	-1.3872	-0.5157
VSTRATIO	-0.0323	0.3032	3.4689 **
ADEXEQTY	-360.3000	-686.2000	332.0000
NCSTEQTY	64.2008	93.9020	-13602.3000
LNASSET	0.1828	0.3972 ***	0.1333
R^2	0.3815	0.3503	0.1838

INCRATIO=net income/total firm income, FARATIO=fixed assets/total firm assets, NDPRATIO=net debt purchases/total firm income, NSPRATIO=net stock purchases/total firm income, ACQRATIO=expenditures on acquisitions/total firm income, LEVER=debt/total firm assets, DIVDUM=dummy variable equal to 1 if increase in dividends, 0 otherwise, FEDTAX=dummy variable equal to 1 if federal taxes paid, 0 otherwise, TLCARRY=dummy variable equal to 1 if positive, 0 otherwise, VSTRATIO=vested participants/total plan participants, ADEXEQTY=administrative costs/equity, NCSTEQTY=normal cost/total firm assets, LNASSET=Log of firm assets

* Significant at .01 level
** Significant at .05 level
*** Significant at .10 level

sample, the size measure is again significant and positive indicating that larger firms are more likely to terminate than smaller firms.

The results of the later sub-period offer support only for the expropriation motive for termination. As in the later sub-period for the –1 sample, the vested ratio is significant and negative. This result suggests a one percent increase in the number of vested workers results in a 3.5 percent increase in the probability of termination.

Model Results for Time=-3: Due to data constraints, only the full model is run for the –3 data. These results are reported in Table 3.9. The results of this model support both the financial and tax motives for termination. The fixed asset ratio and the federal tax dummy are both significant and negative.[16] As with the minus two data, a large effect is observed with the federal tax dummy. Firms with positive tax payments three years prior to termination are more than 80 percent less likely to terminate.

Summary: Collectively examining all of the results of the logistic regression models, the fact that the motives for termination vary in when they are evident suggests that a firm's decision to terminate its pension plan is generally made well in advance of the actual termination. For tax, expropriation and financial reasons other than financial distress (such as the ability to access external capital), the act of termination is not undertaken immediately, as the motives are evident two and three years prior to termination. Considering all of the decisions that must be made when a plan is terminated, such as who will handle the payments to beneficiaries and how workers will be transferred to a

[16] In the –3 sample, several variables fail the tolerance test, however, the results found in all of the alternate models are consistent with the results of the truncated models.

Table 3.9: Results for Overfunded Plans (Minus 3 Data)

	Full Model
INCRATIO	6.9024
FARATIO	-7.0949 **
NDPRATIO	-7.3508
NSPRATIO	4.0170
ACQRATIO	-0.1403
LEVER	1.0959
DIVDUM	-0.0353
FEDTAX	-1.7345 ***
TLCARRY	-0.5689
VSTRATIO	0.8917
ADEXEQTY	-1442.2000
NCSTEQTY	-97.4686
LNASSET	-0.4166
R^2	0.4614

INCRATIO=net income/total firm income, FARATIO=fixed assets/total firm assets, NDPRATIO=net debt purchases/total firm income, NSPRATIO=net stock purchases/total firm income, ACQRATIO=expenditures on acquisitions/total firm income, LEVER=debt/total firm assets, DIVDUM=dummy variable equal to 1 if increase in dividends, 0 otherwise, FEDTAX=dummy variable equal to 1 if federal taxes paid, 0 otherwise, TLCARRY=dummy variable equal to 1 if positive, 0 otherwise, VSTRATIO=vested participants/total plan participants, ADEXEQTY=administrative costs/equity, NCSTEQTY=normal cost/total firm assets, LNASSET=Log of firm assets

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* Significant at .01 level
** Significant at .05 level
*** Significant at .10 level

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replacement plan if one is offered, these results makes perfect sense. The results also suggest that the exception to this is if a firm is experiencing financial distress or if regulation increases the cost of plan administration. If either of these situations occur, the firm is likely to terminate its overfunded plan quickly. This is evident in that the income and administrative expense variables are only significant one year prior to termination. Also the income variable is more significant than any of the other variables explaining the other motives for termination.

Comparing the results for the sub-periods, it appears the motives for termination have changed over time. In the early sub-period, financial distress, expropriation and tax motives are all evident. In the later sub-period, terminations appear to be driven primarily by expropriation and regulatory motives.

The results of the models in which no outlier correction method was used are fairly consistent with the results reported above. The main differences are that some additional variables are significant (all supporting the same motives for termination as discussed above) and the significance of some of the variables is reduced to 15 percent. The only noteworthy difference is that in the models with no outlier correction, the significant negative effect of the income variable is observed in the later sub-period as well as in the earlier sub-period for the –1 models and is also present in the –2 full model and 1993 – 1997 sub-period.

Reported Reason for Termination: Table 3.10 lists the reasons for termination provided by firms at the time the Standard Termination Notice form is completed. The reason for termination reported with the greatest frequency is "restructuring of program", followed

by “benefits costs too high”. Lastly, “adverse business condition” is reported least frequently.

Based on the results of the empirical model, which found statistical support for all of the motives for termination in varying time periods, the reported reasons for termination are empirically supported. If a firm is terminating a pension plan because it has found a better use for the excess assets in the pension plan or because the amount it has contribute to maintain the plan is deemed excessive, it may terminate the plan and replace it with some other type of plan that requires less contributions on the part of the firm. In this case, the firm is simply restructuring its program. On the other hand, if the firm is terminating the plan because of financial distress, it would likely report adverse business conditions as the reason for termination. Half of the firms reported “restructuring of program” as the reason for termination. This suggests that the firms have found a better use for the excess assets in their pension plans as well as the money previously reserved to fund these plans.

The positive and significant effect of the administrative costs variable on the probability of termination would be expected to affect the reported frequency of the “benefits costs too high” selection. This reason is reported by 33 percent of the terminating firms as the reason for termination.

Based on the results of the empirical model, it does appear that the reported reasons for termination are empirically supported. The motives found significant in the logistic models are reported with the greatest frequency by firms terminating overfunded defined benefit plans.

Successor Plans: The information recorded by the PBGC relating to successor plans has changed over time. The data provided in early years indicated only the type of plan in which the majority of participants were placed. The data provided for more recent years indicates the percentage of workers placed into either:

1. New or existing defined benefit plan or other than cash balance plan
2. New or existing cash balance plan
3. New or existing profit-sharing plan
4. New or existing 401(k) plan
5. New or existing simplified plan
6. No plan

For the purpose of this analysis, and to allow for the inclusion of both early and later termination data, the successor plan was placed into one of four categories: no plan, defined benefit plan, defined contribution plan or spinoff plan. For the plans in this sample, all participants were placed in the sample type of successor plan following termination. For example, if the plan terminated and the successor plan falls into the defined contribution plan category, the firm placed 100 percent of its participants into this plan.

As shown in Table 3.10, 50 percent of the terminated defined benefit plans w ere replaced with a defined contribution plan and the remaining 50 percent were not placed into any type of plan. This is with consistent with the more recent literature examining

the shift in market share that has occurred between defined benefit and defined contribution plans. For example Kruse (1995) found that due to the differences in administrative costs, more newly adopted plans are defined contribution plans.

Table 3.10: Reported Reason for Termination, Successor Plans and Organizational Changes

Reported Reason for Termination

Reason	*Percent*
Adverse Business Condition	17%
Benefits Costs Too High	33%
Restructuring of Program	50%
	100%

Successor Plan

Type of Plan	*Percent*
None	50%
Defined Contribution Plan	50%
	100%

Organizational Change

Type of Change	*Percent*
No Change	75%
Reorganization Flag	25%
	100%

The information regarding organizational changes provided by the firm on the Standard Termination Notice form was also summarized. If the firm is acquired by another firm, it could be possible that the acquiring firm is responsible for the successor plan decision. Also, if the firm is liquidated, then it makes sense that there would be no successor plan. Approximately 75 percent of the firms in the sample noted no organizational change occurring in the year prior to termination. Therefore, it is more likely that the successor plan choice of the firm is based more on its decision to move towards defined contribution plans than any external influence.

CHAPTER 4: AN EXAMINATION OF FULLY FUNDED DEFINED BENEFIT PLANS

Introduction

This chapter focuses on explaining the motives for termination of fully funded defined benefit pension plans by analyzing data surrounding the termination event. By looking at data in multiple years preceding the termination, the study is able to determine when the motives for termination are first evident. Next, sub-periods are examined to establish whether or not these motives have changed over time. The examination of multiple years of data and sub-periods adds to the existing pension literature as prior studies have typically focused on only one period of data in attempting to explain motives for termination. This chapter also compares the motives for termination of fully funded defined benefit pension plans with those of overfunded plans found in the preceding chapter as well as in prior literature.

As mentioned earlier, fully funded plans are plans in which the expected reversion is less than $1 million.[17] The analysis of this group of plans is one of the major contributions of this paper as prior termination studies have only examined overfunded defined benefit pension plans. Eliminating plans where the termination produces a

[17] As with overfunded defined benefit plans, the expected reversion amount is used instead of the actual reversion amount in order to provide a cut-off point for the non-terminating plans.

reversion of less than $1 million resulted in several undesirable effects. One, the sample size is considerably reduced since 80 percent of the standard terminations of large plans (100 or more participants) that occurred between 1986 and 1996 resulted in reversions of less than $1 million. Also, motives for termination of fully funded plans will certainly differ from those of overfunded plans (For example, since there is no sizeable inflow of cash to the firm, fully funded terminations may have different financial motives for termination than overfunded plans. Expected differences are discussed in greater detail in the Development of Hypotheses Section.). As a result, only examining plan terminations where the reversion is $1 million or more leaves a gap in the literature, as it ignores the motives for termination of this other group of plans.

Another major contribution of this study is the inclusion of both plan level and firm level data. Only one prior study, Petersen (1992), has extensively combined these two types of data.[18] As discussed in Chapter 3, this study improves upon the methodology of this prior study with the addition of another plan level variable used to measure the cost of maintaining the plan and the examination of multiple years of data preceding the termination. Also, as in all prior termination studies, that study only examines overfunded defined benefit pension plans.

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[18] As mentioned in Chapter 2, only three other studies had examined limited plan level variables prior to that of Petersen (1992); Hamdallah and Ruland (1986) includes union dummies, Stone (1987) considers the excess assets in the plan and Thomas (1989) considers the number of vested workers relative to total participants (but only in a median comparison, not the regression analysis). One more recent study, that of Hsieh, Ferris and Chen (1997), considered the effect of what the authors calculated as the deflated reverted pension assets on the probability of termination.

The second portion of this chapter examines the reasons for termination the firm reports to the PBGC to determine if they are supported by the results of the empirical models. Finally, the types of replacement plans selected by the firms as well as organizational changes occurring in the termination year are summarized. The purpose of examining this data is to determine if the terminations of fully funded defined benefit plans have contributed to the shift in market share that has occurred between defined benefit and defined contribution pension plans and if the terminations and successor plans selected may have been influenced by outside forces.

Description of Data

The sample of firms used in this section of the study is obtained from the same sources as in the previous chapter, including the IRS 5500 Form, Compustat and the Standard Termination Notice for Single Employer Pension Plans. Beginning with all plans that filed the IRS 5500 Form during the sample period, private firms are removed. This screening is done because firm-specific financial data is used in the analysis and that information is only readily available for public firms. Next, plans with less than 100 participants are removed because for these smaller plans, filing the IRS 5500 Form yearly is optional and could potentially bias the results obtained in the study. Third, multiemployer plans are removed as the termination decision for these plans is likely made by multiple firms. Fourth, plans with missing data in any year for the variables used in the model are deleted from the sample. As discussed in detail in Chapter 3, in some of the years in the sample, only limited IRS 5500 data was entered for plans. In later years, the PBGC did add in data for some key fields, however, if the data needed to

construct the variables used in this sample was not entered, that plan year was not included in the data sample.

After rediscounting liabilities to a common rate (this procedure is described in detail in Methodology Section of Chapter 3), the last screening procedure is to eliminate plans where the potential reversion is $1 million or more. This screening procedure is what distinguishes this portion of the study from prior literature on pension plan termination which, like Chapter 3, focused on plans where the expected reversion was $1 million or more. As discussed in the Hypothesis Section below, the motives for termination of fully funded plans intuitively must differ from those of overfunded plans. For example, since firms do not receive a large inflow of cash at the time of termination for fully funded plans, their financial motives for termination are more likely driven by financial distress, not a decision between internal versus external financing.

After all of the filtering, the plans in the sample were matched with data provided on the PBGC's Standard Termination form to verify that the plan did terminate and that the termination year is correctly recorded. Also, plans filing the Standard Termination form that did not indicate a termination occurred on the 5500 Form were re-categorized as terminating plans. The plans remaining after all of these screening procedures are complete are then matched with Compustat data by CUSIPs. As in Chapter 3, hand-matching of data was done for plans that were marked public but did not have a valid CUSIP and also for plans in the 1987 sample (as the IRS 5500 did not start providing CUSIP information until 1988).

Table 4.1 provides some descriptive information about the sample. Removing plans with missing data resulted in a final sample of 110 terminating plans and 1,587 non-terminating plans. This is 38, or approximately 53 percent more terminations than there were for the overfunded sample. Unlike the overfunded sample where there was a sudden increase in terminations and then a gradual reduction, with the fully funded sample, the number of terminations fluctuates over the sample period, with the most terminations, 36, occurring in 1991. As with the overfunded sample, terminations do drop in the most recent years with only one large, standard termination by a public firm occurring in 1997.

The sample includes 60 unique firms in the terminating sample and 357 in the non-terminating sample. Examining the number of firms in each year of the sample indicates that, as with the overfunded sample, firms terminated multiple plans in several sample years. As shown in Table 4.2, the average termination rate is 6.22 percent but ranges from a low of 3.39 percent in 1988 to a high of 8.87 percent in 1993. This 1993 rate is more than 4 percent higher than the highest termination rate for firms with overfunded plans. Finally, the average number of plans per firm is approximately 1.7, which is fairly consistent with the findings for the overfunded sample.

Examining the categories of termination, approximately 92 percent of the firms did not terminate any of their plans in any year. About 1.5 percent more firms terminated all of their plans compare to those firms that only terminated a portion of their plans. This differs some from the results found for the overfunded sample in which nearly

Table 4.1: Summary Statistics for Fully Funded Plans

Number of Plans

Year	*Terminating*	*Non-terminating*	*Total*	*Percent*
1988	8	115	123	7.25%
1989	6	87	93	5.48%
1990	12	173	185	10.90%
1991	36	519	555	32.70%
1992	18	260	278	16.38%
1993	9	130	139	8.19%
1994	2	29	31	1.83%
1995	14	202	216	12.73%
1996	4	58	62	3.65%
1997	1	14	15	0.88%
	110	1587	1697	100.00%

Industry Statistics

Division	*Number*	*Percent*
Mining	77	4.54%
Manufacturing	1435	84.56%
Transportation, Communications, Electric, Gas and Sanitary Services	53	3.12%
Wholesale Trade	45	2.65%
Retail Trade	20	1.18%
Services	17	1.00%
Public Administration	50	2.95%
	1697	100.00%

the same number of firms terminated all of their plans as terminated some portion of their plans.

Industry statistics were constructed based on the 2-digit SIC Code classification scheme. For the purpose of general discussion, these dummies were aggregated to the division level. As in prior termination studies, firm's in the Finance, Insurance and Real Estate Division were deleted from the sample due the difference in the type of financial information provided by these firms and varying regulatory environment they face.

As shown in Table 4.2, the firms in the Retail Trade and Services industries represent 1.18 and 1 percent of the plans in the sample, respectfully. The plans of manufacturing firms account for more than 85 percent of the sample. This large percent of plans of manufacturing firms was also observed in the overfunded sample.

Methodology

The methodology used here is the same as that in the preceding chapter. Before eliminating plans where the expected reversion is $1 million or more, plan liabilities are rediscounted using a common discount rate. The purpose of this procedure is to more accurately categorize the funding status of plans.[19]

After the rediscounting and $1 million screening procedure is applied, the data is analyzed to identify potential econometric problems. Based on the results of the correlation matrix, only the administrative cost and normal cost variables demonstrate any substantial pairwise correlation. This relationship was also observed in the overfunded sample. To further test for multicollinearity, tolerance statistics were calculated. Several variables fail the tolerance test. To verify the accuracy of the results

[19] This procedure is described in detail in the Methodology Section of Chapter 3.

Table 4.2: Firm Statistics for Fully Funded Plans

Firm Statistics

	Full Sample	*Number of Firms Terminating*	*Non-Terminating*	*Plans per Firm*
1988	55	4	54	2.2364
1989	59	6	55	1.5763
1990	109	9	103	1.6973
1991	212	17	207	2.6179
1992	139	13	130	2.0000
1993	93	9	85	1.4946
1994	29	2	27	1.0690
1995	132	11	125	1.6364
1996	52	3	49	1.1923
1997	13	1	13	1.1539
	893	75	848	1.6674

	Termination Category			
	All	*Some*	*None*	*Termination Rate*
1988	1	3	51	3.39%
1989	4	2	53	7.68%
1990	6	3	100	6.59%
1991	5	12	195	4.70%
1992	9	4	126	7.79%
1993	8	1	84	8.87%
1994	2	0	27	6.90%
1995	7	4	121	6.63%
1996	3	0	49	5.77%
1997	0	1	12	3.85%
	45	30	818	6.22%

of the logistic regression models, those variables are alternately dropped from the model to determine if the relationships observed between the independent variables and the dependent variable remain unchanged.

Finally, univariate statistics are calculated to identify potential outliers. The variables are then truncated at the 1st and 99th percentile in order to prevent the outliers from driving the results observed in the models. As with the overfunded sample, non-truncated models are also run and how these results differ from the results of the truncated model are discussed.

The dependent variable is based on the firm's decision to terminate or not terminate the fully funded defined benefit plan in a given year. The dependent variable is therefore defined as zero for plans that did not terminate and one for plans that did terminate. Because the independent variable is qualitative, logistic regression models are used to test the hypotheses.

The basic model is defined as:

Termination = f(financial variables, expropriation variables, regulation variables, control variables)

The termination year is set to time zero for terminating plans. For non-terminating plans, a random assignment method, without replacement, is used to determine time zero. With this procedure, each plan is only included in the model for one sample period. The number of non-terminating plans assigned to each sample year is based on the percentage of the terminating plans that appear in that year. The purpose of this random assignment without replacement is to minimize any potential economic or

firm-specific effects that may be present in any given year. This procedure was used in several prior termination and insolvency studies.

Before the logistic models are constructed, the means of the variables of interest for the terminating plans and non-terminating plans are compared. Data is observed one, two and three years prior to the termination event and then one, two and three years following the termination event. This analysis is designed to determine if there are any substantial differences in the financial status of the two groups of firms and if these differences are still evident subsequent to the termination.

Following the means comparison, logistic models are constructed for the full sample of plans for which data is available. Next, two sub-periods are examined. The first sub-period includes data from 1988 to1992 and the second period from 1993 to the end of the sample period in 1997. This sub-period analysis is done for the models examining data one, two and three years prior to termination. Therefore, the primary set of truncated models contains nine models, the full year model of –1 data and the two sub-period models examining –1 data and so on. Then, several variations of the models are constructed alternately dropping variables to test the robustness of the results as was done in Chapter 3 with the overfunded sample.

The results obtained in the logistic regression models are then compared with the results of the frequency table constructed based on the reasons for termination reported by firms. This is done to determine if the reported reasons for termination are empirically supported. The last section of this chapter examines the successor plan and organizational change information provided by the firm at the time the Standard

Termination form is filed. The purpose is to determine what role termination of fully funded defined benefit pension plans have played in the shift in market share that has occurred between defined benefit and defined contribution plans and if any outside influence may have affected the termination decision.

Development of Hypotheses for Regression Models

This section of the study discusses the motives for termination of fully funded plans. First, financial motives are discussed, then expropriation and regulatory motives, respectively. Variable definitions and the expected signs of the variables based on the motives discussed below are listed in Table 4.3. Throughout the sections, comparisons are made between the expected results for the fully funded plans and overfunded plans. Finally, the reasons for termination, successor plan and organizational change information is analyzed.

Financial Motivations: Since, with fully funded defined benefit pension plans, terminations do not result in a sizeable reversion to the firm, the need for cash would not be a financial motive for termination as it could be for overfunded plans. Therefore, the primary benefit received from terminating these types of pension plans would be the elimination of required contributions and such terminations would likely occur when a firm was experiencing financial distress. As a result, a strong inverse statistical relationship is expected between the profitability measure and the probability of termination as well as the income ratio and the probability of termination. These results would indicate that less profitable firms are more likely to terminate than profitable firms. However, the profitability measure is expected to have a more significant effect on the

Table 4.3: Variable List and Predicted Signs for Fully Funded Plans

Variable	*Definition*	*Predicted Sign*
INCRATIO	Net income/total firm assets	-
FARATIO	Fixed assets (plant, property and equipment)/total firm assets	-
NDPRATIO	Net purchases of firm's own debt/total firm assets	not sign/-
NSPRATIO	Net purchases of firm's own stock/total firm assets	not sign/-
ACQRATIO	Expenditures on acquisitions/total firm assets	not sign/-
LEVER	Debt/total firm assets	+
DIVDUM	Dummy variable=1 if increase in dividends, 0 otherwise	not sign/-
VSTRATIO	Number of vested participants/equity	+
ADEXEQTY	Administrative expense/firm equity	+
NCSTEQTY	Normal cost/firm equity	+
LNASSET	Log of firm assets	?

probability of termination of overfunded defined benefit plans since with these terminations, the firms also receive some cash.

In addition to examining the profitability of the firm, the cost associated with maintaining assets sufficient to honor pension liabilities is also observed. The normal cost relative to firm equity is used to examine this relationship. The normal cost represents the amount the firm has to contribute to the plan in a given year based on projected pension liabilities. Since termination would free up money previously used to

fund liabilities, an inverse statistical relationship is expected between the normal cost ratio and the probability of termination.

The set of variables measuring changes in firms' spending are expected to be either insignificant or negative for fully funded firms. Since these firms will not receive an inflow of cash upon termination, if the firms are truly experiencing financial distress, reducing spending in any way possible becomes even more important in order to prevent bankruptcy. As a result, these variables are expected to be more significant for fully funded plans compared to overfunded plans.

A financially distressed firm with a fully funded plan would likely have a greater need for external capital than a firm with an overfunded plan, because no internal financing is generated by terminating the plan. As a result, an inverse relationship is expected between the probability of termination and the fixed assets while a direct relationship is expected between the probability of termination and leverage. The significance levels of the relationships are expected to differ from those found for overfunded plans. This is because overfunded plans do have another viable option for raising capital. Since they are able to terminate their pension plans and receive the excess assets, they have access to internal capital while this is not an option for fully funded plans. As a result, fully funded plans may be willing to pay more for external capital, and therefore the effect of leverage and the level of fixed assets on the probability of termination is not expected to be as great as it could be for overfunded plans.

Expropriation Motivation: The same argument relating to expropriation motives for terminations of overfunded defined benefit pension plans holds for fully funded defined

benefit plans. This is because, based on Ippolito's (1986) theory, termination of either type alleviates future 'employment conpensation'. However, if expropriation is a strong motive, it is expected that the magnitude of the significance of the vested variable will be greater for overfunded defined benefit plans since managers could experience the greatest gains with these terminations – the reduction in future liabilities as well as the infusion of capital (which increases the amount of assets under their control and provides cash that can be used to fund projects).

Regulation Motivation: The increases in the PBGC premiums and the effect of other legislation on the cost of administration is expected to have the same effect on fully funded defined benefit plans as it does on overfunded defined benefit plans. Therefore, it is expected that the administrative cost variable will be directly related to the probability of termination of fully funded plans.

Control Variables: To best determine the effect of the variables of interest on the probability of termination, several control variables are used. Size is controlled for in all of the models. Also, firm and year dummies are included to control for any firm-specific or economic factors that may effect the results of the regression models.

Summary Information

Reasons for Termination: The same outcomes are expected for the frequency of the reported reasons for termination of fully funded defined benefit plans and the results of the logistic model as they are for overfunded defined benefit terminations. However, as discussed in the previous chapter, since overfunded plans receive an inflow of cash at the time of termination, it is expected that the frequency of 'adverse business conditions'

being the reported reason for termination will be greater for overfunded plans than for fully funded plans.

Shift in Market Share: Successor plan information for fully funded defined benefit plans is expected to be similar to that of overfunded plans. If termination of fully funded defined benefit plans have played a significant role in the increase in market share of defined contribution plans, then no replacement plan or defined contribution replacement plans will occur with the greatest frequency.

Results

This section of the study summarizes the results of the analysis performed for fully funded defined benefit plans. As with the overfunded sample, the means of the variables of interest for both terminating plans and non-terminating plans are reported, followed by means comparisons. Next, the results of the regression models examining data one, two and three years prior to termination are reported. Finally, firms' reported reasons for termination, successor plan information and organizational changes are summarized. The results of the frequency tables are discussed in relation to the results found in the empirical model. Throughout each section, the results found for the fully funded plans are compared to those found for overfunded plans reported in the previous chapter.

Means: Table 4.4 and Table 4.5 provide the means of the variables of interest for the sample of fully funded plans that are discussed in this section. The next sections summarize the results of the means comparisons and present the results of the empirical models. For the firms that terminated plans during the sample period, the income ratio

Table 4.4: Means for Fully Funded Plans Before Time=0

Terminating Plans

Variable	*Minus 3*	*Minus 2*	*Minus 1*
INCRATIO	0.0309	0.0327	0.0226
FARATIO	0.3210	0.3040	0.3225
NDPRATIO	-0.0105	0.0004	0.0153
NSPRATIO	-0.0012	-0.0194	-0.0126
ACQRATIO	0.0392	0.0237	0.0162
LEVER	0.5541	0.5625	0.6708
DIVDUM	0.3611	0.4746	0.4455
VSTRATIO	0.4456	0.4595	0.4319
ADEXEQTY	0.0001	0.0001	0.0002
NCSTEQTY	0.0009	0.0003	0.0005
LNASSET	6.2158	6.4896	6.9028

Non-Terminating Plans

Variable	*Minus 3*	*Minus 2*	*Minus 1*
INCRATIO	0.0365	0.0364	0.0350
FARATIO	0.3890	0.3808	0.3686
NDPRATIO	-0.0048	-0.0003	-0.0013
NSPRATIO	-0.0038	-0.0055	-0.0043
ACQRATIO	0.0230	0.0207	0.0174
LEVER	0.6202	0.6353	0.6339
DIVDUM	0.4488	0.4388	0.4549
ADEXEQTY	0.0002	0.0002	0.0001
NCSTEQTY	0.0010	0.0008	0.0007
LNASSET	6.9004	7.0478	7.0541

increased from year minus three to year minus two, but then decreased between years minus two and minus one. In the years following termination, the income ratio increased steadily. There was some fluctuation in the spending variables prior to termination and a general increase in spending on acquisitions and dividends after termination. The

Table 4.5: Means for Fully Funded Plans After Time=0

Terminating Plans

Variable	*Plus 1*	*Plus 2*	*Plus 3*
INCRATIO	0.0290	0.0349	0.0565
FARATIO	0.3180	0.3270	0.3129
NDPRATIO	0.0407	0.0047	0.0025
NSPRATIO	-0.0388	0.0001	-0.0031
ACQRATIO	0.0244	0.0165	0.0328
LEVER	0.6547	0.6594	0.6568
DIVDUM	0.3085	0.4063	0.5287
LNASSET	7.1500	7.1116	7.3098

Non-Terminating Plans

Variable	*Plus 1*	*Plus 2*	*Plus 3*
INCRATIO	0.0190	0.0330	0.0447
FARATIO	0.3655	0.3605	0.3614
NDPRATIO	0.0038	-0.0004	0.0005
NSPRATIO	-0.0103	0.0024	0.0030
ACQRATIO	0.0190	0.0200	0.0222
LEVER	0.6487	0.6487	0.6383
DIVDUM	0.4289	0.4376	0.4325
LNASSET	7.2020	7.2508	7.2726

leverage measure increased before the termination event and remained fairly constant after termination. This may be the result of firms attempting to obtain external means of generating funds before deciding to terminate their pension plans or due to declining financial condition. The administrative cost and fixed assets ratios remain fairly constant while the normal cost ratio varies leading up to the termination event.

There are some similarities between these results and those of terminating firms with overfunded defined benefit pension plans. For example, for both groups, leverage increases leading up to the termination event. Also, both show declines in income. However, the declines appear greater for the overfunded plans. There are some differences are well. There is no consistent reduction in spending observed in the fully funded sample as there is in the overfunded sample. Second, while the administrative expense variable remains fairly constant for the fully funded sample, it increases for the overfunded sample.

For the non-terminating fully funded defined benefit pension plans, the income ratio is more or less constant leading up to time zero, but drops in the subsequent year and then increases afterwards. Most of the spending ratios fluctuate across the years with only acquisition spending and dividend payments remaining fairly constant. The normal cost variable decreases as time zero approaches while the other variables, including administrative cost and the level of vested workers remain relatively constant over the years.

Comparing the means of the variables of interest for non-terminating fully funded plans with those of non-terminating overfunded plans, many of the variables behave similarly. For example, in both groups, the normal cost variable decreases leading up to the termination event and there are fluctuations in spending throughout the period observed. Also, leverage, the fixed assets ratio and the level of vested workers remain fairly constant. The major difference is in the behavior of the income variable. For the overfunded sample, there is a steady decrease through year plus one and then a steady

increase. The income variable for the fully funded sample remains fairly constant leading up to time zero and drops suddenly in year plus one, after which it increases steadily.

Means Comparisons: The results of the means comparisons discussed here are reported in Table 4.6. This section discusses these results. The following section presents the results of the regression models. The results of the means comparisons indicate that, prior to termination, there are no statistically significant differences in any year in the levels of net income between firms that terminated and firms that did not terminate their fully funded defined benefit pension plans. Leading up to the termination event, the non-terminating firms in all years had significantly more fixed assets, and spent less on debt purchases but more on stock purchases than the terminating plans. Terminating firms were less highly leveraged and had lower normal costs than non-terminating firms two years prior to

Table 4.6: Means Comparison for Fully Funded Plans

Variable	*Minus 3*	*Minus 2*	*Minus 1*	*Plus 1*	*Plus 2*	*Plus 3*
INCRATIO	0.7008	0.6927	0.2458	0.2323	0.8459	0.0813
FARATIO	0.0014	0.0001	0.0013	0.0031	0.0353	0.0022
NDPRATIO	0.7082	0.9434	0.0390	0.0194	0.3810	0.7504
NSPRATIO	0.6424	0.0932	0.1675	0.0079	0.6035	0.2971
ACQRATIO	0.1976	0.4878	0.7336	0.2287	0.2998	0.1040
LEVER	0.1735	0.0184	0.3100	0.8741	0.7679	0.6199
DIVDUM	0.3036	0.5928	0.8468	0.0221	0.5498	0.0800
VSTRATIO	0.8027	0.9273	0.6200	N/A	N/A	N/A
ADEXEQTY	0.0083	0.2784	0.6340	N/A	N/A	N/A
NCSTEQTY	0.8837	0.0103	0.4697	N/A	N/A	N/A
LNASSET	0.0193	0.0155	0.3822	0.7586	0.4510	0.8440

Values are p-values produced from t-tests.

termination; however there are no statistical differences between the two groups of plans relative to these variables immediately prior to termination. Finally, both two and three years prior to termination, firms of non-terminating plans were larger than terminating plans.

Immediately following the termination event, firms of terminating plans spent more on debt purchases, but less on stock purchases than firms of plans that did not terminate. Also, three years following the termination event, firms of terminating plans had greater net income levels than firms of plans that did not terminate. These results indicate that the removable of the pension liabilities and the gain to the firm of the money normally earmarked for pension contributions helped improve the financial position of the terminating firms. As observed in all three years prior to termination, in the three years following termination, firms of terminating plans had fewer fixed assets than firms of plans that did not terminate. Interestingly, in the year immediately following termination, firms of non-terminating plans were more likely to increase dividends, but two years later the difference is reversed; firms of terminating plans were more likely to increase dividends than firms that did not. This may be a signal from management that it has positive outlook concerning the future of the firm.

These results do differ somewhat from the results found for the overfunded sample. For example, with the overfunded sample, the firms of terminating plans were less profitable than the firms of non-terminating plans prior to termination and there were no statistical differences between the two groups following termination. This effect is not observed for the fully funded sample. For these firms, there were no statistical

differences between terminating and non-terminating fully funded defined benefit plans relative to income in the three years preceding termination, but three years after termination, the firms of terminating plans were more profitable than the firms of non-terminating plans. Also, there were no statistical differences in any year in the level of fixed assets between the firms of terminating and non-terminating overfunded defined benefit plans but, in every year observed for the fully funded sample, the firms of non-terminating plans had more fixed assets than the firms of terminating plans.

The results of the means comparison for the leverage variable also yielded different results for the fully funded and overfunded samples. The results indicated that there were statistical differences between the firms of terminating and non-terminating plans two years prior to termination for both samples; however for the overfunded sample it is the firms of terminating plans that are more highly leveraged while for the fully funded sample it is the firms of non-terminating plans. The last major difference in the results observed for the two samples occurs with the size variable. For the overfunded sample, the firms that terminated their plans were always significantly larger than the firms of plans that did not. However, for the fully funded plans, two and three years prior to termination, the firms of non-terminating plans were larger. After that, there were no observed differences in the size of the firms when compared by termination status.

There are some similarities in the results observed for both fully funded and overfunded samples. For example, for both samples, there were never any significant differences in the level of vested workers between the firms that terminated their plans and those that did not. Also, for both samples, either two or three years prior to

Table 4.7: Results for Fully Funded Plans (Minus 1 Data)

	Full Model	*1988-1992*	*1993-1997*
INCRATIO	-5.6166 *	-6.4231 **	-4.2547
FARATIO	-0.2727	0.8760	-3.1067
NDPRATIO	3.1800	4.2700	-1.7189
NSPRATIO	-4.3747 ***	1.8442	-10.3752 **
ACQRATIO	-1.5428	4.5973	-18.8081
LEVER	-0.4211	0.0676	-1.4497
DIVDUM	0.1852	0.3635	0.4068
VSTRATIO	-0.5392	-1.0053	-1.1313
ADEXEQTY	428.9000 ***	709.8000 **	-105.2000
NCSTEQTY	-81.2843	-94.9163	-451.4000
LNASSET	-0.1122	0.0193	-0.3585 ***
R^2	0.2598	0.3006	0.3932

INCRATIO=net income/total firm income, FARATIO=fixed assets/total firm assets, NDPRATIO=net debt purchases/total firm income, NSPRATIO=net stock purchases/total firm income, ACQRATIO=expenditures on acquisitions/total firm income, LEVER=debt/total firm assets, DIVDUM=dummy variable equal to 1 if increase in dividends, 0 otherwise, VSTRATIO=vested participants/total plan participants, ADEXEQTY=administrative costs/equity, NCSTEQTY=normal cost/total firm assets, LNASSET=Log of firm assets

* Significant at .01 level
** Significant at .05 level
*** Significant at .10 level

termination, the cost of maintaining the plans and/or the contribution levels required for the plans of non-terminating firms were greater than those of terminating plans.

Model Results for Time=-1: Table 4.7 provides the results of the minus one full year model and sub-year models for the fully funded plans. The results collectively support the financial and regulatory motives for termination. In the full model, the income variable is negative and significant, indicating that a one percent decrease in the income ratio would increase the probability of termination by 5.5 percent. The administrative expense variable is significant and positive. The Odds Ratio for this variable is large, suggesting that the probability of termination is highly sensitive to changes in administrative expenses.[20]

Looking at the early sub-period model, it appears that they drive the results of the full model as the same effect for the income and administrative expense variables are observed. In the later sub-period model, the only notable result is the negative size effect. This indicates that, between 1993 and 1997, larger firms were less likely to terminate than smaller firms.

Comparing these results to those found with the overfunded sample, the significant negative effect for the income variable is observed in the full model and early sub-period model for both. The level of significance as measured by the p-values is consistent; however, as predicted, the magnitude of the effect is greater for the overfunded sample. A one percent decrease in the income ratio increases the probability of termination by four percent more for overfunded plans than for fully funded plans.

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[20] Four of the variables in the model fail the tolerance test. As with the overfunded sample, additional models were run, alternately dropping these variables. In all of these models, both the income and administrative expense variables remain significant at the 10 percent level or greater.

Model Results for Time=-2: The results of the model examining data two years prior to termination are provided in Table 4.8. The only motive evident two years prior to the termination event is the financial motive. The income and fixed asset variables are significant and negative suggesting that less profitable firms and firms that are less likely to have access to external capital are more likely to terminate.[21] In this model, income has the greatest effect on the probability of termination with a one percent increase in the income ratio increasing the probability of termination by more than five percent.

One interesting result found in this model is the positive effect on the probability of termination observed for the dividend dummy. This suggests that firms increasing dividend payments are more likely to terminate their pension plans than firms that reduced or did not change their level of dividend payments. Examining sub-periods, this effect is only observed between1993 and 1997. This effect may be the result of actions taken by management. If managers know that the firm is not performing to expectations, they may increase dividend payments in an effort to send positive signals to investors concerning the future of the firm. If, however, the financial condition of the firm continues to deteriorate, the firm must then make the decision to terminate its fully funded pension plan.

[21] Two variables fail the tolerance test for the sample examining data two years prior to termination. In the alternate models, two changes in the data occur. When the size measure is dropped, leverage becomes significant and negative. This effect is also observed in the uncorrected models. A plausible explanation for this result is offered in the Summary. When the leverage measure is dropped, the income ratio is no longer significant.

Table 4.8: Results for Fully Funded Plans (Minus 2 Data)

	Full Model	*1988-1992*	*1993-1997*
INCRATIO	-5.2533 ***	-5.3492	-5.6411
FARATIO	-3.6082 **	-2.4033	-3.7359 ***
NDPRATIO	-0.5057	-1.5659	3.4690
NSPRATIO	-5.0260	-3.2524	-4.9481
ACQRATIO	2.5223	-2.1365	10.9994 ***
LEVER	-1.5830	-1.2180	-1.7310
DIVDUM	0.8495 **	0.7508	2.2429 *
VSTRATIO	0.5317	-0.2461	0.4627
ADEXEQTY	83.1045	-301.7000	826.6000
NCSTEQTY	-177.9000	-121.0000	-712.3000
LNASSET	-0.5371 *	-0.7325 *	-0.4018
R^2	0.3021	0.3738	0.4154

INCRATIO=net income/total firm income, FARATIO=fixed assets/total firm assets, NDPRATIO=net debt purchases/total firm income, NSPRATIO=net stock purchases/total firm income, ACQRATIO=expenditures on acquisitions/total firm income, LEVER=debt/total firm assets, DIVDUM=dummy variable equal to 1 if increase in dividends, 0 otherwise, VSTRATIO=vested participants/total plan participants, ADEXEQTY=administrative costs/equity, NCSTEQTY=normal cost/total firm assets, LNASSET=Log of firm assets

* Significant at .01 level
** Significant at .05 level
*** Significant at .10 level

The main difference between the results found for the fully funded model and those of the overfunded model is related to the income ratio. The significant negative effect found for the fully funded sample is not evident in the overfunded sample. This may be the result of the level of funding. For overfunded plans, if they start to experience

financial distress, they are able to first reduce contributions to their pension plans since the assets in the plan are more than sufficient to honor its liabilities. For fully funded plans, they do not have this option. Since they cannot restrict contributions, their only option if they do not have the funds to make required pension contributions or are close to bankruptcy is to terminate.

In both samples, the fixed assets ratio is significant and negative. Though the variable is more significant for the fully funded sample, the magnitude of the effect is approximately the same for both types of plans. The Odds Ratio indicates a one percent increase in the ratio of fixed assets to total firm assets decreases the probability of termination by a little more than three precent.

Model Results for Time=-3: Table 4.9 summarizes the results obtained for the minus 3 data. These results do not indicate that any of the motives for termination are evident at this point. The acquisition ratio is again significant and positive. The size variable is also significant, indicating that larger firms are less likely to terminate plans.[22]

The results of the overfunded model did still show some support for the financial motive for termination three years prior to the event. The fixed asset ratio was significant and negative, implying that firms that are able to access external capital are less likely to terminate. This result is not observed with the fully funded sample.

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[22] Several variables fail the tolerance test for the sample examining minus 3 data. When these variables are alternately dropped, in one of the models, the significance of the acquisition ratio changes to 15 percent and in a second, the leverage variable becomes significant and negative. This effect is also observed in the uncorrected models. A possible explanation for this result is discussed in the following paragraph.

Table 4.9: Results for Fully Funded Plans (Minus 3 Data)

	Full Model	
INCRATIO	-4.1916	
FARATIO	-0.0209	
NDPRATIO	-1.1263	
NSPRATIO	7.6286	
ACQRATIO	8.1752	***
LEVER	-2.4628	
DIVDUM	-0.0253	
VSTRATIO	0.7885	
ADEXEQTY	-260.6000	
NCSTEQTY	40.8314	
LNASSET	-0.5894	*
R^2	0.3582	

INCRATIO=net income/total firm income, FARATIO=fixed assets/total firm assets, NDPRATIO=net debt purchases/total firm income, NSPRATIO=net stock purchases/total firm income, ACQRATIO=expenditures on acquisitions/total firm income, LEVER=debt/total firm assets, DIVDUM=dummy variable equal to 1 if increase in dividends, 0 otherwise, VSTRATIO=vested participants/total plan participants, ADEXEQTY=administrative costs/equity, NCSTEQTY=normal cost/total firm assets, LNASSET=Log of firm assets

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* Significant at .01 level
** Significant at .05 level
*** Significant at .10 level

Summary: Considering the results obtained above, support for the financial and regulatory motives are found. The income variable is significant and negative one and two years prior to termination, indicating that firms that have financial difficulty are more likely to

terminate their pension plans. Also one year prior to termination, the significant positive effect on the administrative variable supports the regulatory motive.

The primary differences in the results of the models examining motives for termination of fully funded plans compared to those of overfunded plans are when the financial motives first become evident and the lack of support for the expropriation motive for the fully funded plans. For the overfunded plans, the negative relationship between profitability is only observed in the year prior to termination, however, for the fully funded sample, this negative relationship is observed one and two years prior to termination. Also, for the overfunded plans, the expropriation motive is supported with a significant positive relationship found for the vested ratio in the minus one and minus two later sub-period models. This relationship is never observed for the fully funded sample.

The models run for the fully funded sample in which no outlier correction method was applied are generally the same as the results reported here. For example, in the minus one full model, the administrative cost variable is significant and positive, but the significant levels drop to 15 percent. The only major difference is that in the models with no outlier correction, the leverage ratio is significance and negative one and three years prior to termination. The leverage measure used here is debt to total firm assets. An alternative measure of leverage, firm liabilities to total firm assets, was substituted. With this measure, the same result is obtained. This suggests that firms that are more highly leveraged are less likely to terminate. This result is counterintuitive and the opposite of what was predicted. One possible explanation for this effect is that if debt is viewed as an alternative means of financing relative to plan termination, for firms that are securing

external financing by increasing their level of debt, their cost-benefit analyses have found that external financing is most economically feasible. This appears contrary to the debt financing theory of Myers and Majluf (1984) which suggests that firms will typically prefer internal to external financing because it is less costly.

Examining the rules established relating to plan termination may lend some insight to this seeming discrepancy. If a plan is underfunded and would like to petition the PBGC for a standard termination, it can do so by adding to its plan assets that amount which makes the plan assets sufficient to satisfy its liabilities. The data compiled by the Pension Benefit Guaranty Corporation indicates that approximately 54 percent of plans of firms petitioning the PBGC for standard termination (at which time the PBGC determines the value of the accrued liabilities using a the same discount rate for all firms) are exactly 100 percent funded. This suggests that a substantial number of firms may be doing this. As a result, the additional contributions made at the time the request for termination is filed is considered part of the costs associated with termination. This, in addition to the other costs associated with plan termination may actually make termination a more expensive means of obtaining financing (through the freeing up of funds that previously were used to fund contributions) than debt.

Reported Reason for Termination: The reasons firms reported for termination of fully funded defined benefit pension plans on the Standard Termination Notice are summarized in Table 4.10. The form allows for the firm to select one of the pre-determined options or write in a reason if the reason does not fall into one of these categories. “Restructuring of

program" and "plant closing" were the reasons selected most frequently (each by more than 36 percent of the sample). "Sale, ownership change" were selected by 14 percent of the sample. The reasons selected with the least frequency are "adverse business condition" and "administrative costs too high".

These reasons are supported by the results of the empirical model which found that terminations are driven by financial and regulatory motives. For example, firms terminating pension plans because they are experiencing financial distress and are attempting to reduce liabilities and alleviate the financial burden of the yearly contributions would likely select "restructuring of program" as the reported reason for termination. The high percentage of firms selecting the "plant closing" option could indicate that firms experiencing severe financial distress close plants as a form of downsizing and reducing expenses. In these cases, if the pension plan specifically covered workers in that plant, there would be need for the plan to continue. However, the observed selection of "sale, ownership change" as the reason for termination may be independent of firms' financial condition. If a firm sells a subsidiary, then it would no longer be responsible for the workers' benefits. Termination in this case may not be related to financial condition but a financial decision by the firm. Examining the reported ownership changes occurring for this sample does support this theory with approximately 35 percent of the firms selling a subsidiary during the sample period.

Comparing the results found here with those found for overfunded plans, firms of both fully funded and overfunded plans selected "restructuring of program" with the greatest frequency. "Plant closing" was never selected by firms of overfunded plans as

the reason for termination. This further supports the idea that the termination of fully funded plans are more likely an immediate response to financial distress. These plans are terminated because firms need to quickly reduce their liabilities and free up cash that could otherwise have be used to fund future contributions while overfunded plans have the option to reduce contributions and use termination of the plan as a last resort.

Successor Plans: As noted in Chapter 3, the detail of information required by the PBGC regarding successors plans has changed over time. For the purpose of this analysis, successor plans were placed into one of four categories: no plan, defined benefit plan, defined contribution plan or spinoff plan. The results are reported in Table 4.10. Forty-eight percent of plans were replaced with no plan and 52 percent were placed replaced with defined contribution plans. These results are consistent with termination of defined benefit plans playing a role in the shift in market share that has occurred between defined benefit and defined contribution plans.

Lastly, the data regarding organizational changes was summarized to determine if the successor plan was affected by some outside force and not the firm's preference for defined contribution plans. More than fifty percent of the sample noted no organizational change occurring in the year prior to termination, 6 noted a merger occuring and approximately 6 percent noted liquidation. This being the case, it is possible that some of the firms' terminations are not totally independent, but may be influenced by other firms or regulatory compliance.

Comparing these results to those found for the overfunded sample, it can be seen that the trends in successor plans are fairly consistent. The primary differences lie in the

Table 4.10: Reported Reason for Termination, Successor Plans and Organizational Changes

Reason	*Percent*
Adverse Business Condition	7%
Administrative Costs Too High	7%
Restructuring of Program	36%
Sale, Ownership Change	14%
Plant Closing	36%
	100%

Successor Plan

Type of Plan	*Percent*
None	48%
Defined Contribution Plan	52%
	100%

Organizational Change

Type of Change	*Percent*
No Change	53%
Merger	6%
Subsidiary Sale	35%
Liquidation	6%
	100%

organizational changes that occurred during the termination year. For the overfunded sample, merger and acquisition activity is never noted as an organizational change and more than 20 percent more overfunded plans note no organizational change compared to

fully funded plans. Again, this may indicate that the termination of fully funded plans may be due more to some external force than in the case of overfunded plans.

CHAPTER 5: CONCLUSION

Introduction

The purpose of this study was to provide answers to three major questions. The first question was whether motives for termination of defined benefit pension plans differ by funding status. Only overfunded defined benefit plans have been studied in prior termination literature. Intuitively, motives for termination of fully funded plans should differ from those of overfunded plans. This is primarily because, unlike with overfunded defined benefit plans, firms do not receive large inflows of cash at the time of termination with fully funded defined benefit plan terminations. Therefore, the need for cash that might drive terminations of overfunded plans would likely not be a motive for termination of fully funded plans. Further, summary information generated by the Pension Benefit Guaranty Corporation indicates that 80 percent of the standard terminations occurring during a period similar to that used in this study are terminations of fully funded pension plans, so an analysis of the motives for termination of these plans seems warranted.

The next question the study addresses is whether or not motives for termination change over time. Some of the previous studies found support for motives for termination that other studies did not. In this study, 10 years of data are examined to determine what motives have driven the termination of both overfunded and fully funded defined benefit pension plans. Next, the sample is divided into two sub-periods to

determine if motives for termination have changed over time. If this is the case, it is possible that the varying results found in previous studies could, in part, be due to the time periods examined. This study also compares the reasons for termination reported by firms with the results of the empirical model to provide an answer to one final question: are firms truthful when they report their reasons for terminating their pension plans? In doing so, the study could potentially provide some insight into the shift in market share that has been occurring between defined benefit and defined contributions. This information could be used by the Pension Benefit Guaranty Corporation and lawmakers in designing legislation that can more effectively address this issue and possibly reverse this effect.

The remainder of this chapter is organized as follows: first, a brief summary of the data and methodology used is provided. Next, the results discussed in detail in Chapters 3 and 4 are summarized. The last part of the chapter concludes by discussing the potential implications of the research as well as areas of further research.

Methodology Summary

The primary data source for this study is the IRS Form 5500. This form provides detailed information regarding pension plans and must be filed by all firms with pension plans that covers 100 or more participants. Employer and employee contributions, total plan assets and asset investments, plan liabilities, participant information and the plan's termination status are some of the information provided by this form. In addition, data from the Pension Benefit Guaranty Corporation providing plan information at the time

the standard termination notice is filed is also used. Finally, firm financial data is obtained from Compustat.

As in most prior studies, the liabilities are rediscounted using a common rate to ensure that plans are correctly classified. Then the sample is divided into two separate samples: overfunded defined benefit plans and fully funded defined benefit plans.

The first portion of the Results sections of Chapters 3 and 4 examines the means of the variables of interest in the three years prior to and three years subsequent to the termination event. Next, for each sample, means comparisons are performed between terminating and non-terminating plans. Finally, logistic regression models are constructed for each sample to determine why firms terminate their defined benefit plans. The dependent variable in all of the models is equal to one if the plan was terminated or zero if it was not. The motives considered fall into one of four categories: financial, expropriation, tax or regulatory.

Results Summary

Chapter 3 Major Findings: Chapter 3 examines the motives for termination of overfunded defined benefit pension plans. The results of the empirical models examining the variables of interest one, two and three years prior to termination find support for all of the motives for termination; however, when the motives are evident does vary. For example, the income variable and administrative expense variable were only significant one year prior to termination. This suggests that firms that are experiencing financial distress or higher administrative costs are likely to take immediate action by terminating their overfunded defined benefit plans to reduce liabilities and outward cash flows and

potentially generate some inflow of cash. For all other reasons for termination, the motives are evident further in advance of the termination event. These results suggest that firms generally make the decision to terminate pension plans well in advance, with the exceptions being when they are experiencing financial distress or the cost of plan administration is high.

Comparing the results of the sub-periods, the results do appear to support the theory that motives for termination have changed over time. Looking first at the data covering the period 1988 to 1992, it appears that terminations during this period were driven by financial distress, expropriation and tax advantages. In the later sub-period, the financial motive for termination is not supported; however the significant, positive result found for the administrative expense variable supports the regulatory motive for termination. This result indicates that regulation increasing the cost of plan administration does significantly impact a firm's decision of whether or not to terminate its plan.

Chapter 4 Major Findings: Chapter 4 examines the motives for termination of fully funded defined benefit plans. It also discusses how these results differ from those found in Chapter 3, which examined motives for termination of overfunded plans. The results of Chapter 4 support both the financial and regulatory motives for termination. The income variable is significant and negative both one and two years prior to termination, indicating that firms experiencing income shortfalls are more likely to terminate their fully funded defined benefit pension plans than firms that are not. The regulatory variable is significant only one year prior to termination. This suggests that legislation increasing

the cost of maintaining a defined benefit pension plan causes a potentially more immediate response than even the income variable.

Examining the sub-period models, both the financial distress and regulatory motives are supported for plans terminating between 1988 and 1992. For plans terminating in later years, access to capital plays a major role in the termination decision. During this period, the fixed asset variable is significant and negative indicating the firms that may potentially have problems accessing external capital terminate their pension plans in an effort to reduce cash outflows.

Summary: Comparing this results to those found for overfunded plans, both fully funded and overfunded plans are terminated in response to income shortfalls and increases in administrative costs. The major difference between the results found for the two samples relates to the expropriation motive. No evidence is found in any time period that supports the expropriation motive for termination for fully funded plans; however, the significant positive effect for the vested variable one and two years prior to termination for the overfunded sample suggests that firms with greater levels of vested workers are more likely to terminate their pension plans.

Public Policy Implications Revisited

The results of this study indicate that terminations for both overfunded and fully funded defined benefit plans are driven by a variety of factors but primarily financial distress and administrative costs. What this suggests is that if the PBGC and regulators are interested in reducing defined benefit terminations, they should closely examine these two issues. The strong result for the financial distress motive may not be something that

can be addressed outside of the firm. From the standpoint of the PBGC, it is probably better for firms to terminate their defined benefit pension plans while they are at least fully funded because if the firm's financial distress persists to the point where the plan becomes underfunded, the PBGC could then be responsible for some portion of the benefits owed to participants.

Other regulators also have some interest in firms' terminating their plans in response to financial distress rather than potentially having underfunded plans. This is because there are limits to the amount of benefits the PBGC will pay to participants. This could potentially create a pool of participants that are not fully compensated for the benefits they were promised which could adversely affect society as a whole, especially if these workers are fairly close to retirement, because their income will then have to be subsidized in some way.

The effect of regulatory changes is something that the PBGC and legislators could address. The general move toward less stringent legislation that would reduce the large differences in the costs of maintaining a defined benefit plan relative to a defined contribution plan would likely be effective in reducing the number of terminations. As shown by the results of this study, both fully funded and overfunded plans consider administrative cost in the termination decision. As found by Kruse (1995), if administrative costs had been equal for the sample period observed, 3.3 percent more newly adopted plans would have been defined benefit plans.

In addition, the regulators may want to re-examine the PBGC premium schedule. The regulatory variable examined in this model includes payments to the PBGC for

insurance to protect the accrued benefits of defined benefit plan participants in the case that a firm becomes insolvent or experiences severe financial distress. Since the PBGC has been operating at a surplus, which reached more than $7 million in 1999, it is possible that the PBGC could re-evaluate this premium schedule. If premiums could be reduced, thereby reducing administrative costs, defined benefit plans might be more attractive to firms and fewer firms would terminate their plans.

Since 1992, there has been a fairly consistent decline in the termination of both fully funded and overfunded defined benefit pension plans. Some of the legislative changes enacted since the 1980s may have contributed to this decline, but some of the additional measures discussed above may make termination even less attractive of an option for firms. As for reviving firms' interest in adopting defined benefit plans, the focus of current legislation on making defined benefit plans more attractive by reducing the cost of maintaining the plan so that it is more comparable to that of a defined contribution plan and allowing firms more flexibility in plan design so they can better cater the plans to the needs of workers are both measures that may be effective.

Areas for Further Research

The results found when summarizing the reported reasons for termination and organizational changes occurring in connection with plan termination suggests that ownership changes and mergers have potentially affected between 6 and 14 percent of the fully funded plan terminations while reorganizations have affected approximately 25 percent of overfunded plan terminations. One interesting question that follows is what role does the funding level of pension plans play in the merger and/or acquisition

decision? Are terminations of plans that are overfunded used as defense tactics to impede possible takeover attempts?

Also, if plans are terminated to free up cash flow (either by reducing liabilities or providing an inflow of cash in the case of overfunded defined benefit terminations), what affect does management ownership play in the termination decision? Are firms with higher managerial ownership more likely to terminate because they may directly reap the benefits of termination if excess assets are distributed to shareholders?

One area of legislation not specifically examined in this study relates to the tax deductibility of pension plan contributions. Legislators have attempted to reduce the use of pension plans as tax shelters for firms by limiting the tax deductibility of contributions to pension plans with the Omnibus Budget Reconciliation Act of 1987. This act limited the amount of contributions that were deductible to the lesser of the accrued liabilities or 150 percent of the excess assets.[23] An empirical analysis that considered the effect of this legislation on the probability of termination may provide some insight into its effectiveness in reducing the termination of defined benefit plans.

Finally, this study strictly examines the motives for termination of defined benefit pension plans. However, the growth in participants covered by defined contribution plans may be cause for more research on these plans. For example, what motivates firms to terminate defined contribution plans? Does plan type affect termination? Are changes in contribution levels of firms a possible indicator of financial distress?

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[23] Albert, R. J. and N. S. Schelberg, Yet Another New Pension Law: The Omnibus Budget Reconciliation Act of 1987, Employee Benefits Journal 13, 20.

Because of the importance of pension plans to workers and legislators, and in the wake recent actions by large firms such as Enron and Ford Motor Company in which these firm's financial conditions have had an adverse affect on pension plan participants, there is likely to be renewed interest in the study of pension plans. These studies may address some of the issues discussed above or issues that have yet to be brought to the forefront.

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